

FIAT
VOLUME I
UNCLASSIFIED FIAT REPORTS

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 FIAT APPENDIX I -- UNPUBLISHED FIAT REPORTS

RADAR

Item No. 1.

FIAT REPORT NO. 632

UNCLASSIFIED

HIGH POWER RADAR JAGDHAUS. Reported by: A. M. Stevens.

13p.

This report presents the information obtained by interrogating a member of the C.Lorenz A.G. who was employed at the "Jagdhaus" a search radar station which had been converted to have a peak pulse modulator power of 750 KW and max. range of 300 km. The received signals were relayed to Berlin through a television cable. The report contains pictures of the 48 ton antenna array. Diagrams and graphs are included.

FIAT ITEM NO. 2

ARTILLERY AND WEAPONS

Item No. 2

FIAT REPORT NO. 979

UNCLASSIFIED

SINTERED IRON SHELL ROTATING BANDS. Reported by: H. L. Krebs. 10p.

This report deals with the manufacturing of iron shell rotating bands by the powder metallurgy process. Special consideration is given to the selection of iron powder and the pressing of the rings in such a manner as to obtain a sufficient porosity in the ring material for the absorption of a lubricant. Appendix I gives a list of German personnel interviewed; Appendix II a list of factories visited; and Appendix III contains a bibliography.

Item No. 2

FIAT REPORT NO. 1035

UNCLASSIFIED

GERMAN DEVELOPMENTS IN HIGH EXPLOSIVES. Reported by: H. Walter. 40p.

This report reviews the latest processes developed in Germany for manufacturing new high explosives. It presents some details of pilot plants and plants for large scale production. The use of the new high explosives for demolition and for gun and rocket propellants is described. The principal explosives discussed are Myrol, based on methyl nitrate; MAN-salt, based on monomethylammonium nitrate; and TETRA-salt, based on tetramethylammoniumnitrate. Myrol in particular has certain outstanding properties which may make it valuable as a future explosive. The pilot plant process of producing Formit is also given. This was the least important of the high explosives developed so was not developed to larger scale production. Five appendices are included, they contain: A list of personnel of Myrol team and a list of German personnel referred to in the report; a list of patents and applications filed in Germany; a bibliography; a summary of properties of principal explosives; and a list of eight drawings.

FIAT ITEM NO. 2

ARTILLERY AND WEAPONS

Item No. 2

FIAT REPORT NO. 1068

UNCLASSIFIED

NOVEL CIRCUIT AND DEVICE FOR THE DETONATION OF POWDER CHARGES. Reported by: H. W. Straub. 11p.
This report describes a novel electrical circuit for the detonation of explosives or possibly for use as a burglar alarm. The device described is operated by a 2-wire trigger line which will activate the circuit by either a short circuit or an open circuit. Power for this device is supplied by two 1.5 volt dry cells which will last for approximately two years, as the steady current during operation is not more than .075 mil-amperes. Diagrams are included.

Item No. 2

FIAT REPORT NO. 1160

UNCLASSIFIED

NOTES ON THE MANUFACTURE OF STEEL CARTRIDGE CASES IN GERMANY. Reported by: R. Schempp. 6p.

This report gives a brief description of the manufacture of steel cartridge cases in Germany. The chemical analysis of a typical suitable steel is given. Desirable surface and structural properties are listed, and the high lights of the manufacture from the starting blank to the finished product are given. Appendix I contains a list of German personnel interviewed.

ROCKET AND ROCKET FUELS

Item No. 4

FIAT REPORT NO. 105

UNCLASSIFIED

SURVEY OF MANUFACTURE OF GRAPHITE RUDDERS FOR V-2 ROCKETS.

Reported by: H. H. Wikle and W. A. Steiner. 8p.

This report presents the methods used in the manufacture of the special graphite rudders or fins used for the initial steering of V-2 rockets, manufactured only by the firm of Siemens Planawerke, with plants at Berlin-Lichtenberg and Meitingen. This initial steering was effected by using the rocket jet of hot gas directly against the graphite rudders, the purpose of the graphite fin being to obtain effective steering control of the rockets from the very instant of firing up to the time that the rockets had attained sufficient velocity to allow control by rudders operating on the air slip stream in the conventional manner. Two diagrams are attached.

FIAT ITEM NO. 5

JET PROPULSION

Item No. 5

FIAT REPORT NO. 418

UNCLASSIFIED

REPORT OF THE GRID MEETING IN BRAUNSCHWEIG, 27-28 MARCH, 1944.

Reported by: A. Planiol. 63p.

Deals with the research work performed by the Germans on axial-flow machines, like turbines, fans, compressors, or superchargers, considered from the standpoint of grid investigation, both theoretically and experimentally. These six translated papers are mostly concerned with experimental results on turbine grids obtained by use of optical methods such as interferences and Schlieren process. Efficiency and flexibility of newer type bucket profiles using thick and well-rounded leading edge are shown to be far superior to that of older ones using sharp blading edge. Pressure and velocity distribution at a turbine rotor in relation to its position relative to the stationary grid (nozzles) is considered. Results of overall measurements of efficiency of bucket grid are compared with those of wake-measurements, and the loss-coefficients are discussed.

FIAT ITEM NO. 7

SIGNAL COMMUNICATIONS

Item No. 7

FIAT REPORT NO. 289

UNCLASSIFIED

CARRIER TELEPHONE SYSTEMS. Reported by: J. A. Parrott. 35p. This report presents technical data on the following types of carrier telephone systems: Open wire systems, cable systems, and multiple unit systems for one or more channels. The Reichspost made greater use of the cable types of systems because most German long distance service is via cable. Open wire systems and a substantial part of the cable system were for the Wehrmacht. All systems inspected used copper oxide modulators and demodulators. The practice in multichannel design was to first modulate all voice channels with a single carrier, usually 6 k.c., to simplify the filter design. Siemens at Munich indicated that they had been using a new type of harmonic coil generator. The core of this coil is made of laminated sheets of 50% nickel and 50% iron. Material, known as "M-89", was used in many of their transformers. A list of references is given. Diagrams of systems and photographs of equipment and underground repeating station are included.

Item No. 7

FIAT REPORT NO. 610

UNCLASSIFIED

DIMENSIONING OF DIRECTIONAL ANTENNAS, OCT. 1945. Reported by: K. Franz and A. M. Stevens. 40p. This report is a translation of a paper covering a resume of the basic dimensioning of directional antennas developed in the last few years by Telefunken G.m.b.H. as written by a physicist and engineer of the Telefunken Laboratories, Dr. Kurt Fränz. Contents include discussions on antennas and ranges, dipole directional antennas, parabolic antennas, slit radiators, di-electric antennas, horn radiators, antenna measurements and matching problems. References, drawings, charts and curves are included.

FIAT ITEM NO. 7

SIGNAL COMMUNICATIONS

Item No. 7

FIAT REPORT NO. 671

UNCLASSIFIED

REPORT ON SOME CHARACTERISTICS OF SELENIUM RECTIFIERS PREPARED BY THE VACUUM METHOD. Reported by: L. H. Matthias. 6p.

This report presents some characteristics of selenium rectifiers produced by the vacuum method. This information is supplemental to CIOS Report 63. The report comprises a number of curves and data showing the performance of selenium rectifiers produced by the A.E.G. vacuum method. Comparative data on rectifiers produced by the S.A. F. method are also given.

Item No. 7

FIAT REPORT NO. 892

UNCLASSIFIED

CERAMIC DIELECTRICS FOR CONDENSERS. Reported by: R. H. Ranger. 16p.

This report deals with the progress made in the German ceramic industry on bodies used for insulating purposes during the year 1946. Appendix I gives list of German personnel interviewed, Appendix II a list of factories visited. Appendix III a bibliography, and Appendix IV a list of illustrations.

FIAT ITEM NO. 7

SIGNAL COMMUNICATIONS

Item No. 7

FIAT REPORT NO. 895

UNCLASSIFIED

PROGRESS IN TIME AND RADIO FREQUENCY MEASUREMENTS AT THE THE P.T.R. HEIDELBERG. Reported by: R. H. Ranger. 184p. This book contains the following reports, including pertinent illustrations, published in German by the "Physikalisch-Technische Reichsanstalt," Heidelberg: (1) Frequency and Time Measurement, by U. Adelsberger; (2) Sensitivity Measurement of Detectors in the Centimeter-Wave Band, by Helmut Hoyer; (3) Report on the work done on Amplitude Modulation of Magnetron Oscillators in the High-Frequency Laboratory, by W. Schaffeld; (4) The Characteristics of Electromagnetic Horns in the Centimeter-Wave Range, by W. Kebbel; (5) Supplements to the report on Michelson-type Radio Interferometers Developed in the High-frequency Laboratory, By W. Schaffeld; (6) Power Measurements in the Centimeter-Wave Range, by Helmut Hoyer and Karl Forger; (7) Report on an Impulse Generator with Variable Impulse Width, Developed in the High-frequency Laboratory, by R. Süss; (8) Report of the High-Frequency Laboratory on Direct Current Amplifiers for Measuring Purposes, by R. Süss; (9) Report on the Michelson-Type Radio Interferometers Developed on the High-frequency Laboratory, by W. Schaffeld; (10) Method for Evaluating the Efficiency of Magnetron Oscillators in the Centimeter and Millimeter-wave Range, by W. Schaffeld; (11) Details of Crystal Clock Circuits, by U. Adelsberger. Summaries of these reports are given in English.

FIAT ITEM NO. 7

SIGNAL COMMUNICATIONS

Item No. 7

FIAT REPORT NO. 908

UNCLASSIFIED

THE SIEMENS AND HALSKE TELEPRINTER, T-TYP 68. Reported by:
V. E. Swain and R. A. Goodman. 23p.

This is a report on a new tape recording teleprinter of substantially different design to those previously manufactured by Siemens and Halske and which incorporates facilities for easy conversion to a unit suitable for tape relay operation. Although this unit was not in the production stage before the conclusion of hostilities, tests of the models available show that definite improvements have been effected over the currently used types. The essential components of the machine are a typewheel tape receiver and a four-row keyboard transmitter. It is designed for single-current operation at 40 mA. Receiving reperforators and automatic transmitter units may be added when required. In one model examined, which was without these attachments, the received characters were printed on 3/8" gummed tape. The second model was fitted with both attachments and the 11/16" tape from the reperforator was arranged to pass beneath the typewheel; characters were thus printed on the reperforator tape about one inch ahead of the corresponding perforations between the second horizontal row of punch holes and the feed holes. The printed characters are small script in agreement with the growing practice in Germany for teleprinters of all kinds. Photographs and cross sectional drawings are included.

Item No. 7

FIAT REPORT NO. 923

UNCLASSIFIED

FURTHER STUDIES IN MAGNETOPHONES AND TAPES. Reported by:
R. H. Ranger. 133p.

This report gives information on the manufacture of three types of acetate tape for use with the magnetophone system of sound recording and for the type K7 magnetophone are also discussed and there are included circuit diagrams for both the K7 and the K7 as modified by the Rundfunk Laboratories for broadcast use. The K7 magnetophone is discussed and several uses of this equipment are described. Photographs, drawings, and circuit diagrams included.

FIAT ITEM NO. 7

SIGNAL COMMUNICATIONS

Item No. 7

FIAT REPORT NO. 1126

UNCLASSIFIED

STANDARDIZATION OF GERMAN CARRIER TELEPHONE AND TELEGRAPH EQUIPMENT. Reported by: E. R. Kun. 11p.

This report deals with the standardization of carrier groups which were designed and constructed in Germany, where the primary group had four channels from six to eighteen kilocycles, the basic group (comprising three primary groups) from 54 to 102 kilocycles, and the super group (comprising five basic groups) from 408 to 648 kilocycles. In addition to this, information is given on the progress obtained in the standardization of components (such as coils, transformers, condensers, copper oxide varistors and bridge rectifiers), polar relays, tool dialing, quad coaxial cables and broad band television cables. The report is supplemented by 1,206 pages of original German documents, which are available as microfilms. (Reel 12GG, PB 73638, frames 1 through 471; Reel 13GG, PB 74327, frames 472 through 861; and Reel 14GG, PB 74326, frames 862 through 1206.)

Item No. 7

FIAT REPORT NO. 1163

UNCLASSIFIED

THE TELEPHONOGRAPH RECORDING SYSTEM. Reported by: H. J. Lichtenberger. 55p.

The described Telephonograph receives and records incoming telephone calls automatically. Furthermore it permits the play-back of these calls to any distant telephone. A mechanism safeguards the play-back against unauthorized use. The instrument utilizes intricate electrical circuits which are described in detail. Diagrams are included, also photographs. This report is in German.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 223

UNCLASSIFIED

WATCH, CLOCK, TIME FUZE AND JEWEL BEARING INDUSTRY IN SOUTH-WESTERN GERMANY. Reported by: J. G. Shennen. 35p.

Brief report on investigations of 6 German firms making time pieces, time fuzes and jewel bearings during the war. A discussion of point detonating fuze arming springs is given, and drawings of the wire rolling machines are included in the appendix. Watch and clock production is dependent mainly on Swiss parts and machinery.

Item No. 9

FIAT REPORT NO. 224

UNCLASSIFIED

SURVEY OF ELECTRICAL CONTROL DEVICES IN GERMANY. Reported by: T. B. Jochem. 25p.

Report is based on visits to eleven German plants engaged in the manufacture of electrical control devices, such as manual switches and starters, magnetic contractors, relays, circuit breakers, and timing devices. Discussion of the devices is followed by brief description of the plants visited. There was little or no development in the German electrical control industry during the war years, and nothing radically new was observed.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 258

UNCLASSIFIED

PROFILE PROJECTORS MANUFACTURED BY ERNEST LEITZ AT WETZLAR.
Reported by: R. H. Portman. 6p.

This report is a description, illustrated with photographs, of the profile projector manufactured by Leitz. Its unusual features are as follows: 1. Light source, a low voltage unit operated by means of a rheostat, projects a horizontal beam which is reflected by a mirror past the object and through the objective lens and projected on a horizontal screen. Light source is equipped with a green filtering unit and heat absorbing glass, which results in a soft green light which is very easy on the eyes. 2. Projection screen is conventional but has a roll attachment feature for the mounting of tracings.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 271

UNCLASSIFIED

GERMAN HIGH FREQUENCY, DETECTOR AND CABLE DEVELOPMENTS.

Reported by: R. H. McCarthy, J. R. Townsend and P. Mertz. 10p.

This report presents information on work of Reichs Anstalt Group, Heidelberg, and of Norddeutsche Seekabelwerke, Nordenham. Subjects treated include the following: 1. Work on frequency calibrations of Reichs Anstalt Group. They base all frequency calibrations on a crystal controlled clock. This furnishes a standard 60 kc. and all other secondary standard frequencies are related to the standard 60 kc. by the use of harmonic steps, or drive of an oscillator through locking in of one of its harmonics. 2. An attenuator seen at Reichs Anstalt consisted of 2 coaxials with the center of each terminated in a plate perpendicular to the axis. 3. Description of magnetrons used by Reichs Anstalt Group. 4. Description of manufacture of detectors made of magnesium and titanium powders at Norddeutsche Seekabelwerke. 5. Dielectric properties of materials at high frequency. 6. Cable products manufactured by Norddeutsche Seekabelwerke.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 292

UNCLASSIFIED

THE MANUFACTURE OF LABORATORY APPARATUS, INSTRUMENTS AND EQUIPMENT. Reported by: J. O. Bengston. 15p.

This report concludes, on the basis of visits to a number of laboratories and industrial establishments manufacturing laboratory instruments, that laboratory apparatus used was not equal to American standards. Laboratory supply industry in Germany which supplied domestic requirements consisted of numerous small manufacturers who sold their products directly to the consumer. It was also observed that scientists were more closely identified with universities and laboratories than in the U.S. Establishments and persons visited included: I. G. Farben, Höchst; Steinheil Sohne, manufacturer of optical instruments; Dr. M. Edelman, manufacturer of precise scientific laboratory instruments; Josef Eschenbach, manufacturer of sun glasses; Heisinger and Sohn, manufacturer of drawing instruments; Stockert and Sohn, manufacturer of direction compasses; Pfeiffer, Arthur, manufacturer of vacuum pumps and compressors; Hartman and Braun, A.G., manufacturer of electrical recording and controlling instruments; Dr. Karl Bosch, formerly Director of Research, A.E.G., Berlin. Special equipment found is noted.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 294

UNCLASSIFIED

INTERROGATION OF GERMAN TELEVISION AND ELECTRONIC AUTHORITIES.
Reported by: R. H. McCarthy, J. R. Townsend and P. Mertz.
11p.

Interviews with (1) Dr. Karolus, University of Leipzig; (2) Dr. Ludwig Wesch, of Heidelberg; (3) Dr. Bothe, Director of the Institute of Physics, Kaiser Wilhelm Institute, Heidelberg; (4) Dr. Carl Bosch, of Heidelberg, and (5) Dr. Bernhard Bartels, also of Heidelberg. Dr. Karolus has done experiments with larger television screens, while Dr. Bosch describes a compact high tension generator for use with infra-red image tubes, which he developed, together with research on phosphors and photocathodes. Dr. Bartels has developed a silicon detector cell that may be superior to American or British detectors.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 351 (354 - 360)

UNCLASSIFIED

GERMAN PHOTSENSITIVE PRODUCTS MANUFACTURE. Reported by:
C. E. Rose and D. R. White. 200p.

Processes and material used in experimental work on two types of lithographic plates and drying equipment used in making Ozalid (photosensitive) papers and foils are described. No progress or changes occurred in the manufacture of Ozalid papers during the war years. Two processes which were more highly developed were: 1. Process in which a mechanical printing plate is produced from a positive original through the use of a colloid and an azide. 2. Process in which a diazo compound of high molecular weight is used in such manner as to yield a printing plate directly, without colloid, when printed from a negative. Appendix I gives chemical structure of diazo compounds no. 1, 2, and 3, couplers and azide. Appendix II outlines operations in positive process for producing printing plates. Appendix III outlines operations in negative process without colloid. Copies of three Kalle and Co. patent applications for these processes and related technical information are given in Appendices IV, V, and VI. Patent applications are: 1. Lichtempfindliche Kolloidschichten zur Herstellung von Gerbbildern; 2. Verfahren zur Herstellung von Druckformen; and 3. Verfahren zur Herstellung von Flachdruckformen. Appendices are in German.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 397

UNCLASSIFIED

SURVEY OF THE CARBON AND GRAPHITE ELECTRODE INDUSTRY OF GERMANY. Reported by: Hugh H. Wikle and Walter A. Steiner.
26p.

This report deals with the process, equipment, and materials in the manufacture of carbon and graphite electrodes and evaluates the performance of the product. It is based on visits to five electrode manufacturing plants and seven representative users of electrodes and designers of electrode equipment. Substitutes for petroleum coke developed were pitch coke, "extract" coke resulting from synthesis of gasoline, from coal, a metallurgical coke, and an anthracite coke. Processes, equipment and production methods are essentially similar to those of U. S. industry. The investigators conclude that the performance quality of German electrodes made during the war ranged widely; some were nearly equal to U. S. products in quality. Production capacities for the manufacture of basic stock and for graphitizing graphite electrodes are given. Report also includes a description of German electric steel furnaces, illustrated by photographs, brief notes on blast furnace linings and on individual plants visited, and a wiring diagram.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 512

UNCLASSIFIED

SURVEY OF LOW-VOLTAGE, AIR CIRCUIT BREAKER PRACTICE, GERMANY.
Reported by: H. C. Graves, Jr. 25p.

In the German small circuit breaker field, the circuit breakers and starters have been combined into one unit, resulting in advantages of simplicity and economy. In the large circuit breaker field, better protection is afforded by the German designs, American practice in the overload situation not being satisfactorily solved. As to the large circuit breaker, descriptions are given of designs of Voigt and Haeffner Company, the A E G Company, and Siemens-Schuckert. Accompanying are drawings and diagrams of German practice.

Item No. 9

FIAT REPORT NO. 514

UNCLASSIFIED

REPORT ON HIGH VOLTAGE SWITCH GEAR. Reported by: O. Jensen.
39p.

Reports on development of high voltage circuit breakers by: Siemens-Schuckert Schaltwerk with their expansion breaker and synchronous breaker, the latter using a tripping device based on a magnetic design; A.E.G. with air blast breakers; Voigt-Haeffner, A. G., Frankfurt am Main, with their contraction breaker; and E. Neumann, Berlin. The gear of Siemens and Voigt-Haeffner are described in detail, accompanied by diagrams and photographs.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 515

UNCLASSIFIED

GERMAN PROGRESS ON MECHANICAL RECTIFIER OR CONTACT CONVERTER.
Reported by: O. Jensen. 3p.

In an attempt by Siemens-Schuckert to build a rectifier which does not backfire, Dr. Koppelman built the first contact converter in 1940. The dc. bus bars are connected to the ac. transformer terminals at proper intervals by means of a mechanical contact, driven by a synchronous motor. This device is very compact; a 2000 KW. contact converter weighs

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 523 (586)

UNCLASSIFIED

STUDY OF THE INDUSTRIAL PROCESSING INSTRUMENT INDUSTRY IN GERMANY. Reported by: A. D. Eplett. 131p.

The field of the investigations covered by this report is that of industrial measuring and controlling equipment especially as used in, and manufactured for, the process industries. This includes apparatus for the measurement and/or automatic control of such variables as pressure, temperature, humidity, flow, liquid level, density, conductivity, hydrogen-ion concentration, etc. The purpose of the investigation was to gain information on recent German developments and to compare German practice with our own, with regard to design, manufacture and application. Plants in Russian controlled territory were not visited. The first section of the report comprises a brief account of each visit made, next follows a discussion by subjects, then detailed reports are given on a few new items, and finally a few general conclusions are drawn. A gas analysis recorder operating on the infra red absorption principle was found widely used in I. G. Farben plants. The instrument is known as "Uras" (a short name for ultra-rot-absorption-schreiber); two excellent German papers on the subject are reproduced in this report together with drawings, graph, and photograph. A supplement FIAT Final Report 586, by Edmund D. Haigler, is attached to this report giving additional data on the application of German instruments.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 532

UNCLASSIFIED

EQUIPMENT FOR USE WITH OXYGEN AND FUEL GASES FOR WELDING AND CUTTING. Reported by: H. R. Pufahl. 81p.

The information presented in this survey report has been collected during September and October, 1945, in visits to a considerable number of manufacturing establishments in Germany which supply or use equipment and welding materials for autogenous gas welding and for cutting and other operations. The report covers collectively the items considered of a high standard of design and construction and others which have not been in evidence in American industry. Included in the report are features of construction of welding and cutting blowpipes, regulators, flame hardening apparatus, welding, cutting and flame hardening machines and information on materials from which they are made. Compositions and uses of the more conventional welding rods and fluxes are also given. The report contains a number of photographs. Appendix A is a list of welding rods described in this report. Appendix B is a list of fluxes described. Appendix C is a list of plants visited. Appendix D is a list of drawings and flow curves.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 534

UNCLASSIFIED

BETATRON DEVELOPMENT IN GERMANY. Reported by: M. J. Gross. 10p.

This report states that, based on information from a number of sources, it is well established that there were only two groups in Germany that had completed the construction of Betatrons (magnetic induction electron accelerators) to the point of getting them into operation. In general, it seems that Betatron development in Germany was far behind that in the United States. Nevertheless, some of the work is different from that tried in the United States and some of the theoretical speculation may be of interest. The work of the following organizations and persons is summarized: M. V. Research Association, Siemens-Reininger Werke, Dr. Max Steenbeck, Dr. R. Wideroe, K. W. Institut, University of Heidelberg, Allgemeine Elektrizitäts Gesellschaft, Drs. Kopfermann and Gundt at the University of Göttingen, and Dr. Schmellenmeier and Professor Ganz. Miscellaneous technical notes, and a list of documents evacuated to Washington, are also included.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 535

UNCLASSIFIED

THE INDUSTRIAL X-RAY FIELD IN GERMANY. Reported by: M. J. Gross. 14p.

The purpose of this report is to supplement and summarize a number of exhibits on industrial X-ray equipment and applications being evacuated to the Joint Intelligence Objectives Agency. A list of the material and a bibliography of literature on the materials are included.

Item No. 9

FIAT REPORT NO. 604

UNCLASSIFIED

THE HELICOPTER ANTENNA. Reported by: A. M. Stevens. 22p.

This report is based upon a translation of a German report by Dr. A. Kirchberg who supervised this work for the Allgemeine Elektrizitäts Gesellschaft (A.E.G.) captive helicopters for use as observation posts and as supports for radio antennas. Flights up to 750 meters were found satisfactory. Some details of the circuits required for use with the helicopter antenna are given. Photographs and diagrams of the captive helicopters, cables, and winches are included.

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FIAT REPORT NO. 610

UNCLASSIFIED

DIMENSIONING OF DIRECTIONAL ANTENNAS, OCT. 1945. Refer to Item No. 7 for a complete listing of this report.

Item No. 9

FIAT REPORT NO. 655.

UNCLASSIFIED

SYNTHETIC SAPPHIRE AND SPINEL PRODUCTION IN GERMANY. Reported by: M. H. Barnes. 17p.

There are 2 plants in Germany which produced synthetic sapphire and spinel boules during the war, the I.G. Farben plant at Bitterfeld and the Wiedes Karbid Werke at Freyung. Both plants employ the basic Verneuil process, the principles of which are known in the U. S. The details of German apparatus and process are revealed here for the first time. A process for hardening spinel bearings so that their performance approached that of sapphire and so that only $\frac{1}{4}$ as much diamond was needed for fabrication was developed.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 678

UNCLASSIFIED

STATUS OF EXPLOITATION OF PHOTOGRAPHY AND OPTICS IN GERMANY.
Reported by: F. E. Bond. 15p.

This report summarizes all of the work done by former investigators in the fields of photography and optics. The appendix lists these reports under the name of the organization presenting the report and they include: U. S. Naval Technical Mission Reports; Technical Industrial Intelligence Committee Reports; miscellaneous reports in Records Branch, FIAT, as well as CIOS and BIOS reports. They cover military, industrial, and scientific developments in Germany during the war in the field of photography and optics. The appendix contains a summary of information relative to German control of industrial research and development in photography and optics, secured from Dr. Kuppenbender. There are also some excerpts from Ninth Army G-2 Intelligence report on German industrial photographic and optical organizations.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 698

UNCLASSIFIED

PHOTOGRAPHING A SINGLE FUEL INJECTION. Reported by: R.
C. Mathewson. 6p.

The Bosch research laboratory engineers have developed an instrument to photograph a single fuel injection within a housing where a gas pressure is maintained equal to the compression pressure of the engine. A typical photograph made with this instrument, and a diagrammatic arrangement of apparatus, are included. A translation of the German text prepared to explain the apparatus and its functions is given. The problem was solved by use of a spark-cinematograph.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 702

UNCLASSIFIED

ELECTRON MIRROR IMAGE TUBE. Reported by: H. Dauber. 42p.

The electron mirror image tube (Elektronen Spiegel Bildwandler) is an image tube based on the reflection of electrons from a semi-conducting infra-red sensitive layer upon which a photo image is projected. This tube was still in the development state at the end of the war, but the results obtained with laboratory models so far would indicate that further development would have resulted in a universal infra-red detection device capable of both active and passive operation (in connection with an infra-red search light or as a simple heat detector). The historical developments leading to the design of the tube are discussed, and the principle of operation is explained. The preparation of the semi-conducting layers as practiced in Prague in the laboratory of Prof. Gudden is presented in detail, together with the latest improvements in the methods of evaporation. The

electron optical system is described and several methods of improving the overall performance by electrical means are included. An appendix shows a brief mathematical analysis of the electron optical performance and a table representing the results of extensive tests with a variety of semi-conducting layers in the electron image tube.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 705

UNCLASSIFIED

HIGH FREQUENCY MAGNETOPHON MAGNETIC SOUND RECORDERS. Reported by: J. Z. Menard. 44p.

This report gives details of the high frequency models of the German Magnetophon magnetic sound recorders. A detailed discussion of the recording system is given, with considerable research and design information pertaining to the mechanical systems, electrical circuits, recording processes, and the tape used for recording. Schematic and performance curves of some systems are included. (JZM). The Magnetophon recorders were developed by the Reichsrundfunk Gesellschaft (German State Broadcasting Service) using plastic tape impregnated with microscopic particles of magnetic materials, and high frequency recording and erasing of the recordings, and found application in most of the broadcasting stations replacing to advantage other types of recordings.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 721

UNCLASSIFIED

THE AGFACOLOR NEGATIVE-POSITIVE METHOD FOR PROFESSIONAL MOTION PICTURES. Reported by: R. H. Ranger. 32p.

Early investigations by representatives of the Signal Corps and the Navy of the Agfa Film Factory at Wolfen revealed that the Agfacolor negative-positive method was used successfully by the German motion picture industry during the war to produce full color professional 35 mm motion pictures. The present report is the result of further investigation of the process and gives: (1) Detailed descriptions of the method for manufacturing the raw films; (2) the exposure technique for the negative and the printing method for the positive, including the methods for obtaining special effects; (3) an outline of the steps involved in producing the sound track; (4) the processing procedure including the formulas for the solutions used, method of replenishment, and some details of the equipment involved; (5) production and cost data; and (6) research and development projects after 1940. Appendix I contains information relative to the preparation of the following: Cyan Component F 654; Magenta Component Z 169; Yellow Component F 535; Cyan Component F 546. Appendix II gives processing times for both positive and negative films and the formulas used in processing. Appendix III is a list of locations visited and personnel interviewed. Appendix IV is a bibliography of German books and articles dealing with the Agfacolor process.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 725

UNCLASSIFIED

HIGH PRESSURE, HIGH TEMPERATURE HEATING, 250 ATM. Reported by: E. W. Halbach. 13p.

High pressure hot water heating systems, with or without a pump, are generally used in Germany in preference to oil, Dowphen (Diphenyl) or Dowtherm, partly because of higher heat transfer but largely because of availability of special equipment. These systems give good heat transfer and allow the use of simple boilers, but specially developed welding technique is necessary for the kettles. Samsreuther, Butzbach has developed two types of kettles, one with double wall construction replaced by welding steel piping directly to kettle walls, called SAMKA-piping, and the riveted or welded staybolt design, called "Warzenschweissung" (nipple-welded kettle) for steam heating only and for pressures up to about 75 atm. Installations have been carried out for 400° and 450° with high pressure water heating using Opitz & Klotz circulation pump. One instance is known where 500° temperature was applied and successfully operated according to Dr. Spangler. Pumpless systems may be used without limitation of temperature provided sufficient level differential is available and vessels are operated with individual furnaces. Drawings are included.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 736

UNCLASSIFIED

THE KONTACTUMFORMER (CONTACT RECTIFIER). Reported by: R. B. Macmullin. 49p.

A brief account of this device is given in FIAT Final Report No. 515, PB 3470 (Vol. 1 Page 263). The contact rectifier is a new rotary machine for converting alternating to direct current with efficiencies higher than have been previously realized. The author reports on the experience with two machines of 9000 amperes and 90 to 180 volts, at Bitterfeld. The report also contains translations of (1) an article from *Electrochemische Zeitschrift* describing the new machine and (2) a report on contact rectifier experience at Ludwigshafen. The report is illustrated with diagrams and photographs.

Item No. 9

FIAT REPORT NO. 742

UNCLASSIFIED

SURGICAL INSTRUMENT INDUSTRY IN TUTTLINGEN, GERMANY.
Reported by: R. L. Gross. 2p.

In an investigation of three surgical instrument manufacturers at Tuttlingen, only one new instrument was found - an electric plaster cutter. An interesting modification of a well known instrument was the only other useful development. This was Jetter and Scheerer's No. E 867 $\frac{1}{2}$, an intestinal and stomach suturing apparatus with an arrangement for coagulation by diathermy. Forging dies and a few production operations differed from standard practice in the United States but most of their manufacturing is conventional. Production methods are discussed briefly.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 761

UNCLASSIFIED

ERNST CERLICH INSTITUT OF THE REICHsstELLE FUER HOCHFREQUENZ
FORSCHUNG (REICH BOARD FOR HIGH FREQUENCY RESEARCH). Re-
ported by: T. M. Odarenko. 70p.

The information on the activities of the Ernst Oerlich Institut, reported herein, is based on an interview with Prof. Schwenkhagen, who was the Institut's head and director. The Institut was organized in 1943 as a member of the Reich Board for High Frequency Research. The activities of the institute include radar technique, work on jamming and anti-jamming, study of atmospheric conditions affecting radio and radar operation, high-frequency measuring technique, study of antenna corona discharges, etc. Its work was considered to be of high importance, and its results very successful. Brief information of 46 war projects handled by the institute are presented here, including various phases of the aforementioned activities. The information gives the date and agency of origin of project, whether practical or theoretical work, name of the German worker connected, special equipment and whether evacuated, technical description, stage reached and details of further work needed, and date completed or reference to any relevant report.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 765

UNCLASSIFIED

ELECTROSTATIC ELECTRON MICROSCOPE. Reported by: C. L. Farrand. 14p.

The purpose of the investigation was to determine the design characteristics and the operational features of the electrostatic electron microscope developed and produced by A.E.G. in Germany. As a result of ten years of work directed by Dr. Ernst Bruche assisted by Drs. Mahl, Recknagel and Kinder, eight instruments were produced. having a performance closely approximating that of the electromagnetic electron microscopes produced in Germany and the United States. The electron lens design is conventional but well proportioned and executed. The resolution secured is about the same as with present practice, being in the order of 50 A.U. Operating difficulties are minor exceptions that flash over between lens electrodes necessitates removal of the lens for cleaning before operation can be resumed. The effect of the electron stream breaking down the oil vapor and producing a deposit on the lenses affecting the image quality is negligible. This report describes the electron lens design and the operation of this instrument, and compares its performance to those of other designs. Reference is made to the bibliography available from German wartime publications. A sectional drawing of the lens is included.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 766

UNCLASSIFIED

WIDE ANGLE TELESCOPE LENSES. Reported by: C. L. Farrand.
6p.

This abstract contains the optical diagrams of the OG19A Aircraft Sight, OG 25 Rear View Sight and OG041 Panoramic Periscope, designed by C. A. Steinheil & Sons, with geometrical data for the glasses. The first is a 1.5 power telescope and the second a 1.0 power telescope. All three sights have 90 degrees apparent field. A list of drawings of the detailed optical elements sent to Washington is included.

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FIAT REPORT NO. 769

UNCLASSIFIED

ELECTRON MICROSCOPY, INFRARED AND OTHER BRANCHES OF APPLIED PHYSICS. Reported by: C. W. Hansell. 34p

This report gives the results of a two-month investigation of German activity during the war in the fields of electron microscopy, the instruments of applied physics and infrared for industrial and military applications. It includes separate reports covering interrogations of scientists of University of Frankfurt, Kaiser Wilhelm Institute, AEG, Siemens-Halske, I. G. Farben, Osram, Leitz and the Reichspost, as follows: Prof. M. Czerny, Prof. Boris Rajewsky, Dr. S. Kiesskalt and Dr. K. Boedecke, Dr. Carl Bosch, Prof. G. A. Kausche, Dr. Rein, Dr. E. Weise, Dr. L. Leitz and Prof. Berek Wetzlar, Prof. Stedder, Dr. E. Bruchs, Dr. Morrell and Dr. Reidel, Dr. Reuter, Siemens-Reinecke (Erlangen), Dr. Lohman, Prof. Walter Heimann, Dr. Carl Fr. Schuh, and Dr. Wolfgang Finkelburg (not interviewed).

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FIAT REPORT NO. 778

UNCLASSIFIED

CONDUCTION OF HIGH TENSION ELECTRICAL CURRENT IN CABLES
EMBEDDED IN HIGH PRESSURE ATMOSPHERE. Reported by: P.
Ganger. 26p.

Investigations are described on the insulation of high tension cables by surrounding them with various gasses under high pressure. These tests were carried out in a 300-meter chamber, at electrical tension up to 300 kv., and at gas pressures up to about 10 atmospheres. The report presents the preliminary experimental work on this novel method of electrical insulation, but does not carry it through to the point where it is ready for industrial application. The report is in German and contains graphs and illustrations.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 780

UNCLASSIFIED

METHODS OF MEASURING SCATTERED LIGHT AT OPTICAL BOUNDARY SURFACES. Reported by: P. H. Keck. 62p.

The report deals with the phenomenon of light scattering occurring on optical boundary surface as, for example, glass to air. The inter-relation of the various quantities are deduced and a new instrument for the measurement of scattered light is described. The scattered light occurring at the border of glass and air is of considerable interest, as the efficiency of optical instruments depends to a great extent on this factor. In this report, complete geometric-optic relations with respect to the scattering are given. All available literature pertaining to this subject has been viewed and the various experimental arrangements known to date are discussed in detail. A new instrument for the extreme sensitive measurement of scattered light is described. Its application for optical flats, lens systems, telescopes and mirrors is shown. A new standard for the exact measuring of glass polish is suggested, using the principle of measuring scattered light. The author is a German scientist who was head of a physical laboratory at the Carl Zeiss firm at Jena.

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FIAT REPORT NO. 781

UNCLASSIFIED

THE LEITZ "XENON" F.1:1.5 5 CM LENS. Reported by: C. S. Weaver. 6p.

This report gives a brief history of the Leica "Xenon" 5 cm. F 1:1.5 lens which was designed and built by the Ernst Leitz Co. at Wetzlar, Germany. Details with regard to manufacture of the "Xenon" are given in figure 1 and 2 and the information contained therein is self-explanatory and complete. This report is based on information obtained from Mr. Henri Dumur, Director of Ernest Leitz Optical Works, and his scientific staff.

Item No. 9

FIAT REPORT NO. 786

UNCLASSIFIED

THE LITHIUM ELECTROLYTIC CELL (DEGUSSA RHEINFELDEN). Reported by: J. S. Smatko. 8p. An electrolytic cell for the production of lithium metal of 97 percent purity is described. This cell is operated at 850 - 900 amperes and 8 - 9 volts. The current efficiency claimed is between 85 - 90 percent. The electrolyte consists of 52 percent lithium chloride and 48 percent potassium chloride maintained at temperature in the range of 500 - 420° C. Yields and quality of the product are effected by the presence of certain impurities, and an electrolyte of comparatively high purity is necessary for best results.

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FIAT REPORT NO. 802

UNCLASSIFIED

THE ARRIFLEX 35 MM MOTION PICTURE CAMERA. Reported by:
A. D. Runkle. 14p.

This report deals with the construction and operation of a 35 mm motion picture camera which uses a new reflex type viewfinder. The camera is primarily a hand held camera especially applicable for news and combat work where stable light weight equipment is required. A schematic drawing of the viewfinder and photographs illustrate the report.

Item No. 9

FIAT REPORT NO. 813

UNCLASSIFIED

PHOTO-REPRODUCTION RESEARCH OF KALLE & CO. A.G. INDEX OF
MICRO FILMED REPORTS. Reported by: G. A. Hinkle. 36p.

This index lists the research reports of the Kalle & Co. A.G., Wiesbaden-Biebrich, Germany, dealing with the photoreproduction processes which are available as FIAT Microfilm Reels C 131C PB 25781) and C 132CPB 44231). The reports are arranged under the name of the authors, namely, Doctors Franke, Zahn Spietschka, von Poser, Werner, Scherer, Süss and Krieger. Each entry contains a brief listing of the contents of the corresponding report. The reports cover the development and improvement of the various products of the ozalid process, using diazo compounds as the light sensitive material, and negative blueprint processes. The reports have considerable interest for the trade and it is expected that at a later date the individual items will be abstracted separately and made available in that form.

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FIAT REPORT NO. 826

UNCLASSIFIED

THE REPRODUCTION OF CONTRAST THROUGH TELESCOPES. Reported by: P. H. Keck. 39p.

In the report it is suggested to use the scattered light, occurring in the image plane of a telescope, as a standard for the quality of contrast reproduction. A method to measure the scattered light is described and its correlation with the reduction in contrast is calculated for simple targets. The results are represented graphically. By relating the decrease in contrast with known physiological data, it is possible to estimate the performance of different field-glasses. Short bibliography, tables and drawings are included. Appendix A presents the original report in German.

Item No. 9

FIAT REPORT NO. 865

UNCLASSIFIED

SIX PAPERS ON TELEVISION. Reported by: F. Schroeter. 76p.

Six subjects relating to the television and cathode ray fields are discussed by Professor Schroeter, a leading expert of facsimile television developments with the Telefunken Company. First is a list of technical activities of Prof. Schroeter, followed by six papers on "new scanning method for television", "phase modulation for television", "channeling time by division on a wide band carrier", "apartment house television distribution", "code modulated telephony", and "multiplex modulated telephony". All papers are in German with English prefaces. There are drawings for each article.

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FIAT REPORT NO. 871

UNCLASSIFIED

THE LUMINOMETER. Reported by: P. H. Keck. 14p.

A new visual photometer, called the Luminometer, was developed in 1943 by Carl Zeiss to measure very faint brightnesses. In contrast to ordinary photometers it has a field of view of 30° and an exit pupil 9 mm., in diameter. The measuring range covered by the Luminometer is 10^{-2} to 10^{-6} millilambert. At a brightness of 10^{-5} millilambert, for instance, the average error of matching brightness in one operation is about 15 percent. The accuracy as compared with that of ordinary photometers is about three times greater. A photograph and schematic diagram of the Luminometer are included, together with a performance graph. This document is written in both English and German.

Item No. 9

FIAT REPORT NO. 887

UNCLASSIFIED

LIGHTWEIGHT ELECTRIC LIGHT WIRING DEVICES AND CONDUIT MANUFACTURED BY THE GERMANS FOR EXPORT. Reported by: O. M. Knoof. 26p.

The latest designs and production methods of principal electrical installation equipment manufactured for export, such as normal Edison screw-base brass shell sockets, and surface toggle switches are summarized. Production methods for a light weight insulated electric conduit (Bermann process) are described. Drawings and photographs included.

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FIAT REPORT NO. 890

UNCLASSIFIED

SELENIUM RECTIFIER DEVELOPMENT IN GERMANY. Reported by:
R. H. Ranger. 27p.

This report supplies the missing page and all drawings to JIOA Report 56 on "Selenium Rectifier Developments in Germany" (PB 21881). A series of photographs is included, showing present manufacture of discs in the S.A.F. plant at Weisenberg. Also a brief summary of the materials required in manufacturing 600 selenium rectifier units is given as currently required in the manufacture of discs by the A.E.G. vacuum process at Dresden.

Item No. 9

FIAT REPORT NO. 891

UNCLASSIFIED

DUXOCHROME PHOTO COLOR PRINTS. Reported by: R. H. Ranger.
51p.

This report is concerned with one of the most successful of the processes developed for producing color prints by combining three separate color prints. It is felt that although many methods of combining the three prints result in good work that none seems to have reached the artistic values achieved by the Duxochrome process, particularly in the hands of an artist such as Hermann Hartz. In this report the general theory of the Duxochrome process is given first. This is followed by the actual formulae. Appendix 2 consists of a pamphlet in English, from the Johannes Herzog & Co. Photochemical Works of Bremen, which gives complete instructions for using the materials. Appendix 3 is a rather complete pamphlet in German by H. C. Opfermann which is entitled "Die Herstellung Fotografischer Bilder in Nat rlichen Farben nach dem Duxochrom-verfahren" (The making of photographic pictures in natural colors, according to the Duxochrome process). Each step of the complete process is illustrated in this pamphlet.

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FIAT REPORT NO. 893

UNCLASSIFIED

INTRODUCTION TO TECHNICAL PHOTOGRAPHIC X-RAY. Reported by:
R. H. Ranger. 7p.

This report introduces a German publication entitled "Einführung in die technische roentgenphotographie" ("Introduction to X-ray photographic technique"), by Professor Dr. John Eggert and Dr. Heinz Gajewski. The prefaces to the first and second editions are translated as well as the table of contents, and the original report rendered by Professor Roentgen at the Physics-Medical Society in Würzburg, Dec 28, 1895. The primary concern of this book is the application of X-ray photographic technique to industrial uses such as inspection of welded joints, castings, moldings, engine assemblies, etc., and to the scientific applications in the study of the crystal-line and molecular structure of materials. Since such varied uses demand different requirements of the photographic materials in distinction to those applied to medical X-ray photography, special films for technical X-ray applications have been developed and their characteristics described. A general introductory section on the fundamentals of X-ray technique is also given. The authors were world leaders in the Agfa Film Works at Wolfen.

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FIAT REPORT NO. 894

UNCLASSIFIED

ELECTROSTATIC HIGH VOLTAGE GENERATORS. Reported by: R. H. Ranger. 15p.

This report gives the description of the electrostatic type of small-size high voltage generators developed by Dr. Carl Bosch, formerly of the research laboratories of A.E.G. At present two types of high voltage generators are being made, the development of which has been completed. The larger one (type N2, rotor diameter 160 mm) delivers a voltage of 30,000 volts at 2 watts; the smaller type (rotor diameter 80 mm) delivers 12,000 volts at about 0.1 watt. Maximum voltages are twice as high as those given. Photographs and drawings are included.

Item No. 9

FIAT REPORT NO. 895

UNCLASSIFIED

PROGRESS IN TIME AND RADIO FREQUENCY MEASUREMENTS AT THE P.T.R. HEIDELBERG. Refer to Item No. 7 for a complete listing of this report.

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FIAT REPORT NO. 899

UNCLASSIFIED

UNIPOLAR IONISED AIR: APPARATUS AND APPLICATION. Reported by: W. M. Swangard. 25p.

This report describes the construction of an apparatus to produce unipolar ionized air. The apparatus was designed and built in the Department for Physical Therapy at the University of Frankfurt Medical School, Frankfurt am Main. Clinical data as available were obtained regarding inhalation treatments for asthma and other conditions of the upper respiratory tract. The main person interviewed was H. Lampert. Photographs, diagrams, graphs and bibliography are included.

Item No. 9

FIAT REPORT NO. 904

UNCLASSIFIED

HIGH VOLTAGE DIRECT CURRENT TRANSMISSION. Reported by: R. I. Stockland. 259p.

This report describes the progress made in German research on high voltage direct current transmission and includes considerable technical data on this problem. The technical data on real and reactive load conditions in direct current transmission and on load regulation and safety controls for direct current transmission systems are especially detailed and significant. Section 1 of this report records the history of the several research projects on high voltage d-c transmission and the results obtained on them. Sections 2 to 14 are translations by the writer of technical papers on the subject, which were found in Germany and which cannot be credited to specific authors at this time. Additional articles of general interest and of known origin, translated by the writer, are included in the appendices. A bibliography, sketches, charts, diagrams and graphs are included.

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FIAT REPORT NO. 922

UNCLASSIFIED

TUBE REDUCERS IN GERMANY. Reported by: L. E. Robinson.
7p.

Comparison of design and production of German tube reducers (called Cold Pilger Mills in Germany) with American tube reducers shows that in general the American machines are more flexible and give greater production. The Germans use V-belts instead of reduction gears and the mechanism for turning and feeding the tubes into the machine differs from the American design. The main drive is at the outlet end of the German machine which makes it more accessible. The turning and feeding mechanism is more rigidly built in the German machine but runs at a lower rate of speed. An enclosed appendix consists of lists of German personnel interviewed, of targets visited and drawings evacuated to TIID, Washington, D.C.

Item No. 9

FIAT REPORT NO. 923

UNCLASSIFIED

FURTHER STUDIES IN MAGNETOPHONES AND TAPES. Refer to Item No. 7 for a complete listing of this report.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 941

UNCLASSIFIED

THE QUANTUM YIELD IN THE ISOMERIZATION OF CROCETINDIMETHYLESTER BY LIGHT. Reported by: I. Hausser and R. Kuhn.
3p.

Cis-crocetin dimethyl ester (m.p. 141°), dissolved in pure hexand with exclusion of oxygen, can be quantitatively rearranged to trans-crocetin dimethyl ester by irradiation. The progress of the transformation can be observed by measurement of the molar absorption coefficient at 4500Å, since the principal absorption bands of the cis and trans isomers are widely separated in this region. Monochromatic light of the wave length 3660, 4350, and 4670Å were used for the transformation. The results are tabulated. Their interpretation shows the quantum yield, independent of wavelength used, to be only .008. This is surprising as in the transformation of transstilbene to cis-stilbene the quantum yield is 1.01. Possible explanations for the low quantum yield are discussed. This research has biological interest as mixtures of cis- and trans-crocetin dimethyl ester can be substituted for the "capulation substances" produced by the gametes of green algae. The document is in German, the title "Die quantenausbeute bei der isomerisierung von crocetin dimethylester durch licht."

FIAT ITEM NO. 9

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FIAT REPORT NO. 943

UNCLASSIFIED

THE MANUFACTURE OF AGFA-COLOR MATERIAL. Reported by: B. Gluck. 92p.

In this report are listed full details for the manufacture of the different Agfacolor materials, including details on: Color Paper; Color Negative (B and G); Color Positive; Color Reversal (Daylight); Color Reversal (Half Watt); Color Copy Film (Reversal). The different requirements of each type of material are discussed and fully described. The twelve different emulsions utilized in the different materials are described and their method of preparation given, also the different additions for each of the three layers. These emulsions are tabulated in each respective section, together with the color components and sensitizers required. The methods of prepa-

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FIAT REPORT NO. 954

UNCLASSIFIED

A HIGHLY SENSITIVE D.C. CONTROLLING AND MEASURING DEVICE. Reported by: R. A. Goodman. 83p.

A description is given of the design principles, constructional details and method of use of an amplifier by means of which continuous and slowly-varying currents can be detected, measured and applied to control functions. The apparatus is characterised by a maximum electrical sensitivity of the order of 10^{-17} watt and a high degree of freedom from disturbance by mechanical shock. Eight appendices, some of which are in German, are included.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 973

UNCLASSIFIED

ENGLISH TRANSLATION OF SEVEN PAPERS ON DISTILLATION AND ABSORPTION EQUIPMENT DESIGN METHODS. Reported by: Dr. E. Kirschbaum. 52p. In these papers by Dr. Emil Kirschbaum are given the results of mathematical analysis and experimental behavior of rectifying columns. The figures referred to in each paper can be found at the end of the individual paper. These seven papers by Dr. Emil Kirschbaum were translated in Washington, D. C. by Mr. Lawrence A. Monroe, for the Technical Industrial Intelligence Division, U.S. Department of Commerce. Since they had not been published in Germany or elsewhere, they should be of interest of chemical engineers. Dr. Emil Kirschbaum is head of the Institut fuer Apparatebau, Technische Hochschule, Karlsruhe. His special field is heat transfer apparatus and distillation columns. He is the author of sixty publications. Dr. Kirschbaum lives at present at Goethe Strasse 22, Groetzingen, near Karlsruhe. He is 46 years of age and is a graduate of the Technische Hochschule, Karlsruhe.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 976

UNCLASSIFIED

THE AGFACOLOR PROCESS. Reported by: W. Schneider. 169p.

This report gives detailed information on color photography and especially on the Agfacolor process. It was written not only for scientists and experts, but will be of value to anyone interested in color photography. During the past ten years, the I.G. Farbenindustrie A. G. in Germany has elaborated considerably on the Agfacolor process. They have proved very successful in producing a relatively simple and efficient method for making natural color photographs. Appendix 1. Bibliography, Appendix 2. List of 85 drawings, diagrams and photographs. In addition to this report several other publications are available on this subject of a more highly technical nature. They are FIAT Final Reports Nos. 721, 943 and 977 (PB 15476; vol. 1, p. 953), (PB 78248; vol. 7, p. 337) and (PB 81274; vol. 7, p. 215) and five microfilm reels which appear in vol. 6, p. 434 of this Bibliography.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 977

UNCLASSIFIED

COLOR REPRODUCTION BY COLOR PHOTOGRAPHY. Reported by: P. H. Keck. 67p.

The report discusses the quality of color reproduction by a photographic process from a physical point of view. In the first part the colorimetric basis for color specification is given and the theoretically expected deviations in chromaticity and luminances are described for certain defined assumptions and using an additive color forming process. The second part of the report reviews a great number of actual data measured on Agfacolor material. The average deviations are about twice as large as theoretically expected under favorable conditions. Appendix I includes a bibliography and Appendix II contains thirty figures.

Item No. 9

FIAT REPORT NO. 987

UNCLASSIFIED

MANUFACTURE OF CAPSULES FOR PRESSURE MEASURING INSTRUMENTS, INCLUDING TEST DATA. Reported by: N. G. Anderson. 12p.

This report gives manufacturing details of capsules used in altitude pressure measuring instruments which are produced by G. Lufft Metallbarometerfabrik, Stuttgart. Also included are details of the techniques used in the manufacture of capsules from beryllium copper. Complete performance data are given for all components described.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1010

UNCLASSIFIED

REVIEW OF THE DESIGN OF SUBMERGED HYDRO-ELECTRIC POWER PLANTS (SYSTEM ARNO FISCHER). Reported by: H. W. Hamm.
42p.

The underwater power plant, System Arno Fischer, represents a new design and a radical departure from conventional methods in the field of water power engineering. The method was applied on a large scale in Germany during World War II and eight hydroelectric plants of this type are now in operation. This report describes the design, its hydraulic characteristics, the method of ice control, and its possible protection against air attack. Construction costs and operating experience are dealt with. A comparison is made between the Kaplan and the Arno Fischer turbines. Photographs, drawings and graphs with legend in German are included. Whether or not this design represents an advance in hydraulic engineering is doubtful, according to the investigator. However, interesting hydraulic and design problems were solved or await solution. Exhaustive recent reports of German engineers covering the theoretical design, experimental research, economic analysis and operating experience are included in the bibliography.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1027

UNCLASSIFIED

THE KRAWINKEL IMAGE-STORING CATHODE RAY TUBE. Reported by:
J. F. Adams, Jr. 21p.

This report covers a new type of cathode ray tube which is capable of storing images over long periods of time. The tube was developed by Dr. Krawinkel with the idea of eliminating flicker in television pictures. This tube may also be used for recording and storing impulses of short duration for comparison purposes. The writing time is about 1 mm. in 5×10^{-8} seconds, and it is believed that this can be increased to 1 mm. in 5×10^{-10} seconds. The first laboratory samples of this new type of cathode ray tube were completed in 1944. Sketches, photographs and figures are included.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1038

UNCLASSIFIED

BEARING JEWELS OF HARDENED SYNTHETIC SPINEL. Reported by:
W. F. Eppler. 42p.

Synthetic spinel can be hardened by heating. This property makes it possible to manufacture bearing jewels from the softer material before heat-treatment, then on proper heating to bring them to a hardness approaching corundum. Experimental work indicates that the optimum temperature and time of heating are 1000° C for 12 hours for spinel of the composition $MgO \cdot 3 Al_2O_3$. Results of the mechanical corrosion hardness test, the Vickers test, the shearing strength, the vibration test and actual application indicate that jewel bearings perform satisfactorily. This report is an English translation. Appendix I contains nine tables and a bibliography is given in Appendix II. The original German text is presented in Appendix III.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1044

UNCLASSIFIED

A STUDY OF THE OPTICAL WORKS OF C.A. STEINHEIL SOEHNE,
MUNICH. Reported by: O. F. Soetbeer. 47p.

This report reviews the Optical Works of Steinheil Söhne G.m.b.H. and evaluates their production. It gives information on research of synthetic crystal growing and optical coatings. Reference is made to Microfilm No. 170-G, PB 70381 in vol. 6, p. 809, which comprises all of the drawings of a newly designed miniature camera now ready for production, additional data pertaining to research, and a complete listing of patents. Those patents of preferred interest are microfilmed complete. The appendix is composed of a series of pictures showing various optical instruments and apparatus for spectrochemical analysis and further contains technical data from laboratory reports. A bibliography is also included.

Item No. 9

FIAT REPORT NO. 1052

UNCLASSIFIED

THE HIGH CURRENT CARBON ARC. Reported by: W. Finkelburg.
226p.

This report covers very thoroughly the present knowledge on high current carbon arc discharge in Germany and is based on original research and development work which was carried out by the author, as well as a considerable amount of material hitherto unpublished. General and physical properties of the high current carbon arc are discussed in detail. In addition, information is included on the various practical applications such as searchlights, studio illumination, movie projection, medical therapeutics, chemical and special uses of the Beck arc and important technical modifications. The text is supplemented by illustrations, sketches and graphs. A bibliography is included.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1059

UNCLASSIFIED

THE PHASE PRINCIPLE IN MICROSCOPY. Reported by: A. T. Brice. 47p.

The report summarizes historical developments in the field of optics leading up to the discovery of the Zernike phase principle. The principle is explained by diagrams and vector analysis. The application of the principle to the design of microscopes is discussed and pertinent formulae are given. The limitations of the phase contrast microscope are outlined by vector diagram and in tables, and brief reports are added of work that has been done by means of the phase microscope in biology, textile research, and physics. Appendices include a bibliography of 37 titles and a biographical sketch of F. Zernike.

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FIAT REPORT NO. 1059 Supplement 1

UNCLASSIFIED

THE PHASE PRINCIPLE IN MICROSCOPY. Reported by: A. T. Brice. 20p.

The report contains an outline of one process of fabrication of phase rings and descriptions of new designs of phase microscope accessories. Appendices include the general formula for calculation of phase retardations, and tabulations indicating correct locations for insertion of phase rings in microscope objective lenses manufactured in Germany heretofore. A schematic diagram giving gear and coupling ratios of a time-lapse mechanism for production of microcinphotography films is shown and briefly described. Appendix I lists German personnel interviewed; and Appendix II lists targets visited.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1066

UNCLASSIFIED

MEASUREMENT OF ATMOSPHERIC ELECTRICITY BY MEANS OF GLIDERS.
Reported by: F. Rossmann. 136p.

This report deals with a new use of a cargo glider in connection with the investigation of atmospheric electricity. The potential gradient, polar conductivity, ion density and dust quantity of the atmosphere up to four and five thousand meters are discussed and supplemented by flight test data of many experiments. All special measuring devices are described from both the theoretical and practical view-points. A number of diagrams and illustrations are included. Appendix I contains a bibliography and Appendix II contains 35 graphical representations of meteorological measurements recorded at Ainring, Germany. In German.

Item No. 9

FIAT REPORT NO. 1086

UNCLASSIFIED

AN INSTRUMENT FOR MEASURING THE LATERAL PRESSURE OF MONOMOLECULAR FILMS. Reported by: H. J. Trurnit. 16p.

This report deals with the construction and performance of an instrument for measuring the lateral pressure of monomolecular films on a water surface. The instrument was constructed by modifying an instrument serving an entirely different purpose (a polarization apparatus) which is in commercial production. An appendix, tables of data and drawings are included. In German.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO.1092

UNCLASSIFIED

PHYSICAL INSTABILITY IN SUPERCRITICAL INFRASONIC FLOW.

Reported by: H. B. Helmbold. 8p.

This paper presents a theoretical treatment of air-flow under local conditions of infra- and supersonic flow; based on previous experimental work on flow-forces and flow-moments, and pressure distribution, measured on symmetric profiles with rounded front-edge and sharp rear-edge. Deviations from the known equations of quasi-parallel flow are presented. The location and course of the vertical compression wave under increasing Mach number are followed. If the shock wave, which increases with flow-velocity, reaches sufficient magnitude, the boundary layer begins to flow counter-current, and finally there is a complete separation of the outside layer, with considerable loss in lift. Additional rear-edge shock-waves appear when the supersonic region reaches to the rear-edge of the profile. Several graphs are included. In German.

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1097

UNCLASSIFIED

THE STATISTICAL DISTRIBUTION OF ERYTHROCYTES IN THE COUNTING CHAMBER. Reported by: H. Schwan. 15p.

The errors occurring in blood counts made by the usual microscopic methods are partly due to the statistical distribution of the blood corpuscles in the counting chamber. The question arises whether this error is to be evaluated by the usual error calculation. This is the case if the Poisson Law applies. But according to the investigations of several authors the distribution of the erythrocytes in the chamber is not a Poisson distribution. In the submitted publication this question is examined anew and it is determined that the distribution satisfies the Law of Poisson. It is shown that the reasons for the diverging results of earlier investigations are to be attributed to psychological effects on the counting personnel. In German, with an abstract and a biographical note in English.

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Item No. 9

FIAT REPORT NO. 1099

UNCLASSIFIED

THE DETERMINATION OF THE DIELECTRIC AND MAGNETIC PROPERTIES OF INHOMOGENEOUS DIELECTRICS, ESPECIALLY BODY TISSUES, IN THE DECIMETER WAVE RANGE. Reported by: H. Schwan. 123p. The known comparative methods for the determination of complex resistances by means of the Lecher-arrangement do not permit measurement at wavelengths below 3m. The progress in ultra-shortwave therapy requires urgently an accurate knowledge of the electrical constants of body tissues and methods of measuring them in the decimeter wave range. The reported resonance method is an absolute method which permits measurement even at short wavelengths, is simple in application, and allows high accuracy. In the second chapter it is shown that, in the decimeter wave range, only the non-quasistationary resonance methods are of practical value. In the subsequent chapters, the considerations are discussed which apply to measurements in the 40 to 300 cm range when using resonance arrangements. The disturbing effects of wire supports and elimination of these effects are discussed. In the fifth chapter formulas are given which permit the easy computation of the dielectric and magnetic properties of materials from their complex initial resistances. The still simpler methods of calculation which become valid when special properties of the materials are taken into consideration are likewise given.

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Item No. 9

FIAT REPORT NO. 1105

UNCLASSIFIED

THE NAVIGATIONAL BEAM SYSTEM "ELEKTRA-SONNE." Reported by:
O. V. Heil. 174p.

This report covers the theory and design of different navigation systems, based on the interference principle. The "Elektra-Sonne" was found the most favorable of these systems. It utilizes a rotating pattern of guide beams with side markings. The construction, qualities, and installation of the "Elektra-Sonne" system are described in detail. A great number of diagrams, tables and illustrations are included. The first chapter giving a good survey of the subject has been translated into English, the remaining four chapters are in German.

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FIAT REPORT NO. 1111

UNCLASSIFIED

GERMAN WIND TURBINE PROJECTS PLANNED DURING THE HITLER ERA.
Reported by: H. W. Hamm. 23p.

A large number of engineers in Germany occupy themselves with the problems of wind power. Their object is to solve the acute power shortage without exhausting natural resources. They also feel that increased coal production would not be of real benefit to the German economy, but would be drained away in the form of reparations. They feel fairly certain that the same would not be true of wind power installations. Another reason for the activity in the wind power field, which is taking place with the revival of the "Arbeitsgemeinschaft fuer Windkraft", is the fact that this is the only way in which aeronautics is so closely connected with the war potential that it has been prohibited by the allied occupation forces. This new activity is of very recent origin and consists mainly in the revival of old projects, some of which are mentioned in this report. It must be pointed out that the very extensive work previously accomplished in the wind power field consists of plans, projects and propaganda only. One turbine of twenty kilowatt capacity had been erected at one time for test purposes, and it was destroyed by war action. Appendix I gives a list of German personnel interviewed, Appendix II a bibliography, and Appendix III contains illustrations of various wind turbines.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1113

UNCLASSIFIED

THE STATUS OF HYDRAULIC RESEARCH IN GERMANY. Reported by:
O. Kirschmer. 18p.

This manuscript gives a short review of hydraulic experimental practice with a discussion of laws governing laboratory and scale model work, a description of experimental technique and the advantages and disadvantages of large open air and small inclosed laboratories. One section is devoted to the development of water turbine and pump installations. It contains an evaluation of hydraulic laboratory practice and scale model testing of hydraulic structures. An evaluation of the report and biographical note on the author are in English, while the text is in German.

Item No. 9

FIAT REPORT NO. 1116

UNCLASSIFIED

QUICK CALCULATION OF A-C HIGH VOLTAGE OVERHEAD LINES.
Reported by: E. Krohne. 15p.

This report presents a new quick method of calculating high voltage A-C overhead transmission lines for distances from 200 to 1000 km. While the curves included apply only to the three types of conductors in common use in Germany, the method can be applied to other types of conductors without difficulty. Appendix I gives a bibliography; and Appendix II contains five diagrams.

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1132

UNCLASSIFIED

THE SINGLE SCATTERING AND ANNIHILATION OF FAST POSITRONS.
Reported by: Z. Ho and W. Bothe. 6p.

The preliminary results of an investigation into the cloud tracks of positrons are briefly reported. Nearly head-on collisions between a positron and an electron are easily observed. During such collisions there seem to occur deviations from the theory, probably because the magnetic interaction has not been considered adequately in the theory. Three cases of the annihilation of a fast positron were observed. This corresponds to expectation according to the theory of H. A. Bethe. During collisions of positrons and nuclei, the high losses of energy are much too frequent to be explained solely through the current theory of "Bremsstrahlung." Text is in German.

Item No. 9

FIAT REPORT NO. 1133

UNCLASSIFIED

PERFORMANCE OF A NEW STANDARD LABORATORY FRACTIONATING COLUMN. Reported by: G. R. Schultze and H. Stage. 36p.

Abstract and biographical note in English

1. Stage, Herman
2. Fractionating columns—Tests—Germany
3. Verein Deutscher Ingenieure, Berlin
4. FIAT FR 1133

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1147

UNCLASSIFIED

A GERMAN UNIVERSAL CONDENSER MICROPHONE. Reported by:

A. M. Wiggins. 8p.

This report includes a description of a directional capacitor microphone made by Georg Neuman and Company. The principle of operation and methods and materials used in its construction are described. Drawings included.

Item No. 9

FIAT REPORT NO. 1155

UNCLASSIFIED

THERMAL IMAGES FOR TRANSFORMERS. Reported by: O. Sauter.

26p.

This report describes a "thermal image" for transformers which was developed in Germany as a simple means of measuring the temperature of the transformer windings. Use of this device permits loading the transformers according to winding temperatures and indicates the safe limit of temporary overloads. Appendix I contains diagrams and illustrations.

Item No. 9

FIAT REPORT NO. 1163

UNCLASSIFIED

THE TELEPHONOGRAPH RECORDING SYSTEM. Refer to Item No. 7 .
for a complete listing of this report.

FIAT ITEM NO. 9

PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

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FIAT REPORT NO. 1171

UNCLASSIFIED

INSTRUMENT FOR THE MEASUREMENT OF THE RADIO-ACTIVE CONTENT OF MOVING GASES. Reported by: K. Sittel. 6p.

Abstract and biographical note in English

1. Geiger-Müller counters—Germany
2. Radon—Measurements—Germany
3. Counters, Radon—Germany
4. Kaiser Wilhelm Institut für Bio-Physik, Frankfurt am Main, Ger.
5. FIAT FR 1171

Item No. 9

FIAT REPORT NO. 1172

UNCLASSIFIED

MEASUREMENTS OF THRESHOLD SENSITIVITY OF THE HUMAN EYE IN THE NEAR INFRARED. Reported by: H. Schaefer and A. Schraub. 15p.

Abstract and biographical note in English

1. Schraub, Alfred
2. Vision—Tests—Germany
3. Kaiser Wilhelm Institut für Bio-Physik, Frankfurt am Main, Ger.
4. FIAT FR 1172

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PHYSICAL AND OPTICAL INSTRUMENTS AND DEVICES

Item No. 9

FIAT REPORT NO. 1175

UNCLASSIFIED

A NEW FREQUENCY MODULATED RADIO SONDE. Reported by: E. Menzer and K. Sittel. 8p.

This report describes a frequency modulated radio sonde for temperature determination developed at the Marine observatory at Greifswald between 1942 and 1945 on the principle of the Finnish Radio-Sound and suitable for mass production and application. The indicating element is a condenser with a temperature sensitive dielectric. The differences in construction and measuring elements from the Finnish instrument as well as a gauging and testing of sender and ground receiver are described. Illustrations are included. The report is in German.

Item No. 9

FIAT REPORT NO. 1176

UNCLASSIFIED

A NEW STEREOSCOPIC EFFECT AND ITS PHYSIOLOGICAL INTERPRETATION. Reported by: H. Schaeffer and F. Ebner. 18p.

The report describes a newly observed effect on stereoscopic perception produced by interpolating a colored filter in front of one eye and discusses a physiological interpretation of the effect in binocular vision. An 18 to 45% improvement in visual depth perception is claimed which may be based on centrally registered differences in frequency acting on two optic nerve fibres of corresponding cones in the right and left eye. Tables are included. This report, in German, was issued by the W. C. Kerckhoff-Institut. Bad Nauheim, Germany.

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FIAT REPORT NO. 1182

UNCLASSIFIED

THEORY OF THE REFLEX KLYSTRON. Reported by: H. Doering.
25p.

The report discusses theoretically the general base of a reflex Klystron with mixed drift space and reflector field focussing. The case of simple reflector field focussing which is of practical importance is analyzed in detail. The physical properties of the reflex Klystron, operating in different frequency ranges, are described. Bibliography, diagrams and graphs included. In German.

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Item No. 9

FIAT REPORT NO. 1302

UNCLASSIFIED

THE BLANKOPHORS _ OPTICAL BLEACHING AGENT OF I. G. Reported by: A. S. Richardson. 23p.

Chemical nature, methods of manufacture and testing of the four Blankophors B, R, WT, and RG are described and their use as textile finishing agents and in laundering discussed. These products are essentially colorless and have a brightening effect and a tendency to neutralize brownish discoloration due to their bluish fluorescence in the ultraviolet of daylight. The "Lumogens," another group of fluorescent materials manufactured by I. G. are water-insoluble organic pigments intended to have essentially the same color in daylight and in ultraviolet light. There is also a formula for "Product # 14" one of the 34 experimental optical bleaching agents studied (p. 13). The bibliography on pages 16-18 refers to twenty items and lists the following additional German patent applications from I. G.: (1) I-68063. Appl. date, Oct. 17, 1940 "Textile- and paper-material." Claim: Textile- and paper-material comprising a water-soluble compound of the type: $\text{Aryl-NH-CO-NH-Aryl-CH=CH-Aryl-NH-CO-NH-Aryl}$. (2) I-68293. Appl. date, Nov. 24, 1940 "Organic material." Claim: Organic material comprising a salt of a carboxylic or sulfonic acid derivative of a compound of the formula $\text{X-NH-CO-NH-Aryl-CH=CH-Aryl-NH-CO-NH-X}$, in which X is hydrogen or optionally an organic radical. (3) I-70042. Appl. date, July 12, 1941. "Process for preparation of derivatives of the diarylimidazole series." Claim: Process for preparation of 4,5-diarylimidazole derivatives which is characterized by treatment of 4,5-diarylimidazolones or 4,5-diarylimidazolthiones with sulfonating agents. (4) I-68416. Appl. date, Dec. 9, 1940, "Bleaching agents and bleaching baths." Claim: In addition to conventional chemical bleaches, the above agents and baths comprise compounds which have affinity for textile fibers and adequate stability with respect to the chemical bleach, and which fluoresce on irradiation with ultraviolet to short-wave visible light. (5) I-68417. Appl. date, Dec. 9, 1940, "Discharge or resist printing of white patterns." Claim: In the printing of white patterns by discharge or resist printing, the use of compounds which have affinity for textile fibers and which fluoresce on irradiation with ultraviolet or short-wave visible light. In German.

SUBMARINES

Item No. 12

FIAT REPORT NO. 906

UNCLASSIFIED

STYROFLEX-SPIRAL SUBMARINE CABLE. Reported by: R. A. Goodman. 26p.

This report covers the manufacture of submarine cable of the coaxial type in which the dielectric consists of air spaced windings of styroflex tape. The design and method of manufacture as well as the electrical and mechanical characteristics of the cable are described and particulars are given of the instances in which this type of cable has so far been used in the submarine communications field. Details are given of the special machine used for building the styroflex tapes around the central conductor, and the manner in which the pressure-tight joints are made between cable lengths is explained. Graphs of attenuation constant and characteristic impedance against frequency are appended. Photographs and drawings are also included.

FIAT ITEM NO. 16

LAND MINES

Item No. 16

FIAT REPORT NO. 701

UNCLASSIFIED

GERMAN MINE DETECTORS. Reported by: F. E. Bond. 50p.

The purpose of this report is to present information on the development and technical characteristics of all types of electronic devices used by the Germans for the detection of buried land mines. Appendix 1 gives the physical and technical characteristics in detail of each type of detector and includes discussions of their relative performance. Appendix 2 contains notes on the induction igniter, sound igniter, mine listening, and searching sets. Appendix 3 gives the sources of references. Illustrations, wiring diagrams, and sketches are included.

ARMoured FIGHTING VEHICLES

Item No. 18

FIAT REPORT NO. 578

UNCLASSIFIED

AUTOMOTIVE POWER TRAINS, CLUTCHES, TRANSMISSIONS AND STEERING MECHANISMS. Reported by: E. F. Norelius and W. F. Shurts. 59p.

This report describes an investigation of war and immediate prewar developments in Germany on automotive transmission trains, more particularly for heavy equipment, including clutches, transmissions, torque converters and steering methods for full track vehicles. Points of particular interest in this report may be summed up as follows: (1) The design of discs for multiple plate wet clutches and manner of shaping to avoid warpage; (2) the electro-magnetic shift transmission; (3) the new Voith hydraulic torque converter; (4) the epi-cyclic type steering methods in lieu of conventional methods used in the United States and the hydrostatic method of steering under development towards the end of the war. In general it was found that there had not been any great development in Germany on transmission trains for automotive equipment. Photographs and diagrams are included. The appendix includes a catalogue of the Zahn-Radfabrik Friedrichshafen A. G. model AK7-200 hand operated shift, a list of documents and parts which have been forwarded to the Automotive Industries Division of the Joint Intelligence Objectives Agency, in Washington D. C., and a list of organizations investigated, including company name, location, individuals interrogated, date of investigations, or investigations and in so far as was possible, products manufactured during the war.

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VEHICLES

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FIAT REPORT NO. 412

UNCLASSIFIED

PASSENGER CAR AND TRUCK CHASSIS. Reported by: A. M. Wolf.
52p.

This report deals with an investigation which was made to analyze German automotive construction from the designing and engineering aspect and to see how it compared with American practice. The study covers passenger car and truck chassis, taking into consideration the frame, suspension, axles, brakes, steering gear and correlated parts. The investigation disclosed nothing new beyond information on German vehicles already disseminated prior to the war. A number of practices were found that were antiquated according to the American concept. Appendix A which discusses the Opel experimental suspension system is illustrated with drawings. Appendix B lists the catalogues, manuals, etc. which describe the procedures of the various companies.

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FIAT REPORT NO. 574

UNCLASSIFIED

FLYWHEEL MAGNETOS: R. BOSCH G.m.b.H., STUTTGART. Reported by: A. J. Poole. 11p.

This report states that Bosch produces a combined ignition and lighting unit for motorcycles which is simple, compact, reliable and probably superior to anything of its kind regardless of where manufactured. As most of the motorcycles made in Germany are of the single cylinder type the ignition problem was reasonably simple. On a 2 cylinder machine a generator and a single contact breaker housed together with a distributor is used. The following types of flywheel magnetos are described: UE-1, UE-2, ULE-1, ULA-1CR, ULD-1A, ULD and UF-1C1. Bosch also made magnetizers to magnetize simultaneously all of the magnets in a magneto flywheel after assembly in the casting. An interesting method of machining the core pieces to carry the coils, and the core ends to be inserted in the flywheel, was to machine them in pairs from round "Dynamo-Eisen" stock. Appendix contains list of samples, catalogs, prints, etc., forwarded to the Joint Intelligence Objectives Agency in Washington. Diagrammatic drawings and graph are included.

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FIAT REPORT NO. 578

UNCLASSIFIED

AUTOMOTIVE POWER TRAINS, CLUTCHES, TRANSMISSIONS AND STEERING MECHANISMS. Refer to Item No. 18 for a complete listing of this report.

Item No. 19

FIAT REPORT NO. 580

UNCLASSIFIED

PROCESS OF MAKING AUTOMOTIVE RADIATORS USING INTEGRALLY FINNED CHANNEL - MACHINED FROM FLAT ZINC SHEET. Reported by: A. B. Modine. 2p.

A design drawing is included.

Item No. 19

FIAT REPORT NO. 581

UNCLASSIFIED

BEIER INFINITELY VARIABLE SPEED FRICTION DRIVE TRANSMISSION. Reported by: O. D. Treiber. 20p.

This transmission, designed by Dr. Josef Beier of Brown-Boveri, Mannheim, is a new development of the infinitely variable friction drive incorporating multiple friction cones of variable pitch radius in combination with epicyclic gears, a centrifugal clutch and a free wheel or over-running clutch. They have been developed for automotive transmissions, constant speed aircraft supercharger and engine generating drives, and also variable speed machine tool drives. A description of the transmission and a discussion of its automotive applications is followed by a list of patents applied for in different countries, including patent numbers in most cases, and design drawings and photographs.

VEHICLES

Item No. 19

FIAT REPORT NO. 654

UNCLASSIFIED

THE GERMAN MOTORCYCLE INDUSTRY SINCE 1938. Reported by:
S. Dupont. 86p.

The entire industry is reviewed, with full descriptions of the standard models built by BMW (Bavarische Motoren Werke A.G), NSU (Neckarsulm Vereinigte Fahrzeugwerke A.G), Zündapp Werke, Victoria Werke A.G., Ardie Werke A.G., Standard Fahrzeugfabrik; Triumph Werke A.G., Stehr Daimler Puch A.G., Fichtel und Sachs A.G., Ilo Werke, and DKW. The report also describes racing models, army models, scavenging systems, and electrical systems. Since 1938 the German motorcycle design was strongly affected by three things: The Nazi plan for getting German goods into foreign markets, the shortage of automobile manufacturing manpower, and the shortage of motor fuel and materials. Appendices contain: Specification and data tables; list of catalogs, handbooks and blueprints which have been forwarded to Washington, D.C.; list of equipment to be shipped to the United States; and drawings and photographs of equipment.

VEHICLES

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FIAT REPORT NO. 673

UNCLASSIFIED

SUMMARY REPORT ON AUTOMOTIVE ITEMS OF INTEREST FOUND AT
GERMAN LABORATORIES. Reported by: A. W. Pope, Jr. 9p.

This report concerns investigations made at seven German laboratories on piston engine development and some information is given on combustion turbine engines. Combustion research and engine fuel test methods were also investigated. The development is described of a single cylinder engine unit at the Herman Göring Laboratory at Volkenrode for the testing of different fuels under different operating conditions. The FKFS cuff valve 2-cycle engine, their 48 cylinder radial aircraft engine, and their Diesel fuel test engine and method are described. The DVL double injection fuel system, their oxygen boost system for aircraft engines, their turbine blade thermocouples and their sheet metal air cooled turbine blades, and also the quartz engine indicator pickup element used in engine combustion research at Munich are taken up. The combustion turbine of Hinkel Hirth and the L'Orange pumpless Diesel engine are described and performance information given. Intava aviation gasoline knock testing is touched upon.

FIAT ITEM NO. 19

VEHICLES

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FIAT REPORT NO. 800

UNCLASSIFIED

NICKEL CADMIUM STORAGE BATTERIES IN GERMANY. Reported by:
P. E. Plehn. 24p.

This report describes the manufacturing processes used in Germany to produce the active materials and the plates of nickel cadmium storage batteries of tubular pocket, flat pocket and sintered porous plate designs. A list of drawings of some special machines used in this production is given. The drawings are on file in Washington, D. C.

Item No. 19

FIAT REPORT NO. 947

UNCLASSIFIED

DEVELOPMENTS DURING THE WAR IN AUTOMOTIVE IGNITION, PARTICULARLY BY THE FIRM OF ROBERT BOSCH, G.m.b.H., STUTTGART. Reported by: H. Goelzer. 48p.

Reviews the field of starting motors, generators, regulators associated with generators, ignition analyzers and magnetos, including descriptions of mechanical construction and giving significant electrical data. Seven appendixes include: list of German personnel interviewed; list of targets visited; bibliography; list of material evacuated; characteristic curves; and description of Bosch testing equipment.

VEHICLES

Item No. 19

FIAT REPORT NO. 1043

UNCLASSIFIED

ACCESSORY DEVELOPMENTS OF THE GERMAN AUTOMOTIVE ENGINE
INDUSTRY. Reported by: K. A. Beier. 35p.

This report reviews present design and application of positive displacement superchargers, cooling fans and water and oil pumps used on passenger car, truck, and bus engines, as obtained from interrogating personnel who are either at present or were in the past connected with the German motor industry. There are no Final Reports in the Records Branch of FIAT (US) relating to any of these components therefore no Bibliography is included in this report. Four appendices are included, containing a list of German personnel interviewed and list of targets visited; a translation of report on cooling tests conducted with a Ford truck and the original report in German; and a list of photographs and drawings.

ENGINEER EQUIPMENT

Item No. 20

FIAT REPORT NO. 564

UNCLASSIFIED

BOILERS, FORCED DRAFT BLOWERS, STEAM PIPING AND EVAPORATORS
USED IN THE GERMAN MERCHANT MARINE. Reported by: M. L.
Ireland, Jr. 51p.

A survey of the efficiency of the various types of boiler installations in German merchant vessels, indicates that German boilers do not realize the high efficiencies which are now current practice in America. German oil burning merchant marine boilers average 83% efficiency. Benson forced circulation, Lamont forced circulation and exhaust gas boilers, Schmidt Hartman binary type, Capus type, and Wagner natural circulation type systems are employed. Design details of heat transmission, air heaters and economizers, super heat control, oil burners (the Saacke rotating type burner especially), forced draft blowers, uptake and stack, evaporators and high pressure steam piping are discussed. Appended are data tables of geared turbine drive ships, turbo electric drive ships, boiler particulars for natural and for forced and special types of circulation, materials for boilers and steam piping, evaporating plants, and photographs and drawings of the various installations. The Gneisenau, Vaterland, Tannenberg, Pretoria and other ships are included in these data tables.

FIAT ITEM NO. 21

METALLURGY

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FIAT REPORT NO. 81

UNCLASSIFIED

CENTRIFUGAL CASTING OF METALS IN GERMANY. Reported by:
J. T. Mackenzie. 24p.

This report consists of a summary of developments in centrifugal casting of metals and detailed reports on individual plants visited. Generally, centrifugal casting had developed to a degree comparable with that in U.S. and in advance of that in England. Casting of steel gun barrels was highly developed and the use of the thin sand mold may be a real advance in casting heavy tubing. Thin sand lined mold was also used very successfully for the horizontal spinning of high chrome steel tubing. An interesting feature was the use of a thin copper sheet of a lining for the cast iron mold. The following plants were visited: Kupfer and Drahtwerk, Osnabrueck; Bochumer Verein, Bochum; Hochfrequenz Tiegelstahl, A. G., Bochum; Schalker Verein, Div. of Vereinigte Stahlwerk, Gelsenkirchen; F. Krupp, Essen; Annener Gusstahlwerk of Ruhrstahl, A. G., Annen; Alfred Teves Maschinen and Armaturen Fabrik, Frankfurt; Buderusche Eisenwerke, Wetzlar; Halberger Huette, Saarbruecken.

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METALLURGY

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FIAT REPORT NO. 89

UNCLASSIFIED

METALLURGICAL AND INDUSTRIAL DEVELOPMENTS IN MAGNESIUM.

Reported by: J. D. Hanawalt. 126p.

This report consists of a general account of this industry and a detailed survey of processes, metallurgical developments, and products at the following plants: I.G. Farben, A.G.; Wintershall A.G.; Mahle K.G.; V.D.M. Heddernheim; V.D.M. Aschaffenburg; B.M.W.; Messerschmidt A.G.; W. Schenk Leichtmetall Werke; Leipziger Leichtmetall Werke; Opel. A list of magnesium fabricating companies and aircraft producers is given and statistical data on the production and distribution of magnesium are reproduced. Outstanding among methods observed was the unique technique for die casting magnesium at the Mahle Co. Photograph and drawings included. A microfilm (49 frames) accompanying report as an Appendix contains drawings of B. M. W. casting machines and machinery at Mahle and Elektrometall G.M.B.H.

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FIAT REPORT NO. 229

UNCLASSIFIED

COPPER, LEAD, ZINC, TIN AND ANTIMONY SMELTING AND REFINING IN NORTHWESTERN GERMANY. Reported by: A. J. Phillips.

50p.

This report is a comprehensive summary of the copper, lead, zinc and tin industries in Germany based on visits to the following plants: Nord Deutsche Affinerie; Zinnwerke Wilhelmsburg GmbH; Bleikupferhütte, Bleihütte Clausthal; Metallwerke Unterwesser A.G.; Zinc Oxyd Hütte; Georg von Giesche's Erben GmbH; Gewerkschaft Mechernicher Werke; Metallhütte

METALLURGY

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FIAT REPORT NO. 230

UNCLASSIFIED

METALLURGICAL PRACTICE IN THE PRECISION CUTTING TOOL AND GAGE PLANTS IN GERMANY. Reported by: A. H. D'Arcambal. 223p.

Report based on visits to thirteen German plants engaged in making precision cutting tools and gages. The metallurgical practice in each of the plants was studied with respect to: Composition of the various materials used; metallurgical inspection of incoming materials; heat treating equipment employed; hardening treatments used; grinding finishes; lapping methods; and artificial seasoning or stabilizing treatments. A general summary is given and individual reports are made on each firm. In general the quality of the conventional type cutting tools and gages was inferior to that of American products with respect to design, accuracy, and wear life. This applies both to wartime and pre-war products. There are three supplements containing a large number of photostats showing in detail the design and manufacture of carbide tipped cutting tools, gages, and drawing dies, obtained from the Krupp, Widia Tool Plant at Essen. Supplement A contains general information on the manufacture and design of carbide products. Supplement B contains photostats showing the design of carbide tools and gages. Supplement C duplicates much of the material in Supplement A, but has some additional sheets and several pages of English translation of this material.

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FIAT REPORT NO. 295

UNCLASSIFIED

LITHIUM EXTRACTION AND USES. Reported by: G. T. Motock.
32p.

A report on the extraction of Lithium and its salts in Germany. This process has been handled mainly by units of Metallgesellschaft A.G. and Deutsche Gold und Silber Scheide Anstalt ("Degussa") both with headquarters in Frankfurt. Zinnwaldite is the major source of Lithium in Germany. Extraction methods are described. Lithium is used in copper and other alloys, while Lithium salts are used in making various chemicals. The major use of Lithium during the war was in a lead alloy called Bahnmetail, used extensively for railroad bearings.

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FIAT REPORT NO. 316

UNCLASSIFIED

ALUMINUM FABRICATION AT DURENER METALLWERKE, A.G., DUREN, RHEINLAND, GERMANY. Reported by: H. H. Hall. 5p.

The Duren Works, although a fairly large factory, has had little new aluminum fabricating equipment added in the last few years. Most of the special cartridge case machinery, put in to make case blanks, had been moved to a safer location. Artillery fire has damaged practically all the buildings. Although there is an extrusion press, several forging presses and strip mills that are efficient and fairly modern, there is nothing of outstanding importance or interest.

METALLURGY

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FIAT REPORT NO. 386

GERMAN BALL AND ROLLER BEARING MANUFACTURE. Reported by:
E. E. Gloss. 24p.

This study of the German anti-friction bearing industry was undertaken to investigate any new production methods that had been developed during the war years. Research and development work was confined to a search for substitutes for material that was scarce or expected to be in short supply. The pressure of current needs was so great that no routine bearing life tests were run during the last two years of the war. Production was inferior to American production in general. The report discusses wood retainers of pressed wood tubing; vapor lubrication of high speed spindle bearings; production of bearing races by an upset forging process; and production of unground case hardened carbon steel bearings. Appendix I gives materials used for races and for forging machine tools as well as specifications for rings of various diameters and the third gives a long operation chart of the sequence of operations, machines used, methods of inspection and machining time per unit. A list of bearing plants visited and personnel interviewed is also appended.

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FIAT REPORT NO. 387

UNCLASSIFIED

THE GERMAN STEEL CASTING INDUSTRY. Reported by: M. T. Ganzauge and C. W. Briggs. 155p.

Detailed survey of steel casting industry based on investigations of representative foundries. Topics treated in general introductory statement are: record of production, classifications of castings, raw materials, melting and molding practices, tapping and pouring methods, gating and risering technique, cleaning practices, heat treatment, welding, inspection and testing, centrifugal casting, permanent molds. Castings produced during war were mostly armament castings or parts of equipment to be used by armed forces or to assist in prosecution of war.

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FIAT REPORT NO. 395

UNCLASSIFIED

METALLURGICAL PRACTICES IN GERMANY IN THE FIELDS OF NON-FERROUS MELTING AND CASTING. Reported by: F. L. Wolf and I. Egeberg. 44p.

This report gives, in considerable detail, a picture of the German practices in melting and casting in some of the light metal industries. Particular attention is paid to continuous casting. Schematic drawings, charts, sketches, and a bibliography are included.

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FIAT REPORT NO. 406

UNCLASSIFIED

NON-FERROUS METAL ROLLING MILL PRACTICE IN GERMANY. Reported by: E. W. Rouse. 30p.

Report of a survey to determine if any new or original processing was employed in German mills, particularly with respect to copper and brass in flat form. Few of the plants visited were operating and those only to a limited extent. Judgment, therefore, had to be based on examination of the machinery and conversations with plant officials. Very little flat copper has been produced recently and brass has been required almost entirely as a strip. The outstanding point of interest with respect to rolling mill equipment is that most of the mills are using old breakdown and rundown rolls, but that all were equipped with relatively new strip mills. Individual reports are given on the following mills: Wieland Werke, near Ulm; W. Prym & Co., Stolberg; Kreidler Metall Draht Werke, near Stuttgart; Vereinigte Deutsche Metallwerke, Werdohl; Osnabrucke Kupfer und Draht Werke, Osnabrucke; Westfalische Kupfer & Messing Werke, Ludenscheid; Eduard Hueck, Ludenscheid and Elspe; R. & G. Schmolle, Menden; Vereinigte Leichtmetall Werke, Hanover-Linden; Westfalische Leichtmetall Werke, Nachrodt; I.G.F. Planned Magnesium Mill, near Darmstadt; Aluminum Walzwerke Singen, Singen. Appendix I contains a list of other plants with brief mention of activities.

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FIAT REPORT NO. 408

UNCLASSIFIED

METALLURGICAL COKE; DR. - ING. A. THAU, DIDIER - WERKE, A.G., BERLIN. Reported by: F. H. Reed. 93p.

This report consists of three reports written by Dr. Thau and translated into English by him. These are: 1. Metallurgical coke from coal of Upper Silesia; 2. Metallurgical coke from non-coking coals with special reference to the two-step carbonization process; and 3. Experiences and suggestions as to the economy of raw materials for the hydrogenation or low temperature carbonization of true coal as well as for the metallurgical working-up of small-grained iron ores. The second article is the longest and contains literature references and should contain 16 illustrations which are missing.

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FIAT REPORT NO. 419

UNCLASSIFIED

ROHN LOW FREQUENCY INDUCTION FURNACE. Reported by: W. M. Pollitzer. 13p.

This report originally appeared as part of a larger report bearing the same FIAT number and consisting of extracts and English translations of material from the files of the Friedrich Krupp Research Laboratories. The low frequency induction furnace first built at Heraeus and developed at Krupp is an attempt to design an electric steel melting furnace on a basically new system. According to limited data available, reactions in this furnace take place quicker and much more completely than in other electric furnaces. Slag reacts more directly than in other processes. The problem of the refractory material has not been solved at the pilot plant at Essen. Photographs, drawing, and graphs are included.

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FIAT REPORT NO. 432

UNCLASSIFIED

THE MANUFACTURE OF REFRACTORIES AND INFORMATION CONCERNING THEIR USE IN THE IRON AND STEEL INDUSTRY OF WESTERN GERMANY. Reported by: G. E. Seil. 145p.

A total of fourteen refractory plants and two steel plants were visited in order to study the manufacture of refractories in Germany. Acid basic, and all basic refractories were studied for developments in plant lay-out, processing equipment, dryers, and kilns. Detailed information has been obtained on the Scheidhauer and Giessing process for the manufacture of acid refractories including the production of tank blocks. Information was also obtained regarding the production of carbon block, magnesite block, fire clay dolomite, and other products. This included raw materials, substitutes, and the composition of the mixes. The properties of the finished products were evaluated. It was noted that some standardization of sizes and shapes had been obtained during the war and the refractory manufacturers expected this to continue. In general, the silica or aluminum silicon refractories have been made by conventional methods and in plants which for the most part have not been too well laid out. The investigators also found no new techniques either physically or chemically in the basic refractories. The all basic furnace employing a suspended roof has met with great success in Germany but it is stressed that metallurgical conditions in the open hearth are different in the U. S. Various flow diagrams, diagrams of equipment, and other data are included in the report. The appendix includes several reports in German regarding standardization of products. Translations of these articles are also given.

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FIAT REPORT NO. 433

UNCLASSIFIED

ZINC BASE ALLOYS EXTRUSIONS, WIRE, ROD AND SHEET. Reported by: S. Tour. 3p.

During the war Germany developed the use of extruded bars shapes and tubes of high strength zinc base alloys, as a substitute for free cutting brass. Four plants wherein the work was done were visited and briefly reported on in this study: Dalta Metall Gesellschaft, Düsseldorf; R. & G. Schmöle, Menden; Osnabrücker Kupfer & Drahtwerk, Osnabrück; and Messingwerke Unna, Unna.

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FIAT REPORT NO. 485

UNCLASSIFIED

FERRO-ALLOY MANUFACTURE AND USE. Reported by: A. B. Kinzel. 17p.

This survey of the Ferro-Alloy and Carbide Industry of Germany included a sufficient number of the larger plants and technical directors so that it may be considered to be complete. This is particularly true in view of the fact that from 1939 on the government forced complete cooperation between all ferro-alloy producers, including exchange of all technical information and frequent interchange visits.

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FIAT REPORT NO. 501

THE GERMAN ALUMINUM AND MAGNESIUM INDUSTRIES. Reported by:
H. R. Habricht. 97p.

This comprehensive report consists largely of tables presenting statistical data on production and consumption and related fields, from raw material through use of the end product. A map gives location of plants. The report does not cover technical matters, manufacturing processes or other engineering and chemical questions.

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UNCLASSIFIED

FIAT REPORT NO. 522

THE BERYLLIUM INDUSTRIES IN GERMANY AND ITALY. Reported by:
H. A. Slomann and C. B. Sawyer. 144p.

This report covers an investigation of the beryllium industry in Germany over the war period 1939-1945. Full details of the production processes used in the manufacture of beryllium and of its light and heavy metal alloys have been obtained together with many working drawings of plants and equipment. Uses for the metal and its alloys have been investigated both at the production centers and by the interrogation of independent research workers, while details of the total volume of production and its distribution among the various uses have been obtained. The principal firms producing this metal and its alloys were Deutsche Gold und Silber Scheidersanstalt (DEGUSSA) and Heraeus Vacuumschmelze A.G., in Germany, and Societa Anonima Processi Privative Industriale (SAPPI), in Italy. Report contains the following appendices: A set of 14 photographs of equipment; a list of individuals interviewed; 20 photostated figures comprising flow sheets, plant layouts, and drawings of equipment (some figures will reproduce poorly); and 18 exhibits, being translations of documents on such subjects as extraction processes, statistics of production, customer lists, analytical procedure, etc. Twelve other exhibits (Nos. 8, 12, 13, and 19 to 27 inclusive) have been micro-filmed in Europe and are available in PB 15000.

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FIAT REPORT NO. 524

UNCLASSIFIED

PRODUCTION OF ALUMINUM. Reported by: J. C. Black, J. R. Akers, and R. S. Sherwin. 48p. This report covers bauxite purification, aluminum electrolysis, foundry practice, flouried and tar recovery from furnace fumes and the composition and properties of certain alloys. The report is accompanied by three tables, four drawings and two flow sheets.

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FIAT REPORT NO. 530

UNCLASSIFIED

SURVEY OF MATERIALS ENGINEERING IN THE PUMP, COMPRESSOR, AND ROCK DRILL INDUSTRIES. Reported by: B. F. Shepherd. 50p.

Twenty-seven German plants in these industries were visited to determine organization procedure for assigning the proper material of construction, methods of specifying this material, inspection procedures, methods of heat treatment, and any new or unusual designs. The industries failed to specify special materials for special parts. Drills without anvils and the use of carbide bits are described. The report contains sixteen pages of drawings and tables.

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METALLURGY

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FIAT REPORT NO. 531

UNCLASSIFIED

STUDY OF METALLURGICAL COKE DEVELOPMENTS IN METHODS OF PRODUCTION AND TESTING. Reported by: F. H. Reed. 136p.
A copy of Dr. Ing. Henry Hoffman's original article in German on the testing and evaluation of blast furnace coke "Beurteilung, prüfung und bewertung der physikalischen beschaffenheit von hochofenkoks," makes up the body of this report. It is preceded by a summary in English. The quantitative evaluation of the physical properties of metallurgical coke for blast furnace use is discussed in detail by Dr. Hoffman. Coke structure, bulk density and the various stability tests are reviewed. Although the experienced blast furnace operator becomes sufficiently expert in evaluating coke quality to make changes in operating conditions necessary for a certain degree of efficiency, his judgment is necessarily empirical and is based upon several properties of the coke. Proper sampling for test purposes is difficult and many of the tests have not been adequately developed. Stability tests made on coke produced from a stamped charge of Saar coal show that the top, middle and bottom parts of the oven charge have different stabilities. The coke from the middle part gave a higher percentage over 40 mm size. The coke from the top of the charge is more friable, while that from the bottom is more fissured, has smaller piece size, but is more stable. The physical constitution of coke from different horizons of the coke charge is subject to large fluctuations. Size and structure of the coke cells have considerable influence on reactivity. Roughly, the average bed temperature seems to be lower with lower price stability, low specific gravity and low porosity, although there are many exceptions to this generalization. Bulk density determinations are greatly influenced by piece size and classification, moisture content, size of measuring vessel, leveling of the charge and procedure of making the test. The more important methods and variables are discussed. The formulae of Rombach, Curran, Marquard, Thibaut and Völkingen for evaluation of the physical characteristics of blast furnace cokes are given and discussed. Photographs, tables and graphs are included.

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METALLURGY

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FIAT REPORT NO. 536

UNCLASSIFIED

FUSED QUARTZ MANUFACTURE IN GERMANY. Reported by: M. J. Gross. 27p.

This report describes the methods of manufacturing clear fused quartz at the Osram G.M.b.H., Berlin, and the W. C. Herraenus Platinschmelz, Hanau, both methods differing from those in use in the U. S. Diagrams are included.

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FIAT REPORT NO. 569

UNCLASSIFIED

MANUFACTURING BRONZE ALUMINUM OR OTHER FLAKE METAL POWDERS. Reported by: H. F. Mandle. 54p.

The most modern equipment and methods for the production of aluminum powder in Germany are to be found in the greatly enlarged plant of Eckart, the Government owned plant at Pfaffenhofen operated by Schlenk and the new Schlenk plant at the same site. Worthy of comment are the following developments. Zinc powder was made as a cheap metal base for analine dyed bronze powder, as a substitute for aluminum powder and for mixing with copper powder for the manufacture of commutator brushes. Tin powder was made by first producing strips in small roller mills. As the metal is difficult to flake, 2 to 3 per cent of antimony and zinc is used as a hardener. At the Eckart Werk in Hauselfeld there is a large aluminum atomization plant containing three electrical furnaces for melting the aluminum ingots, and nine spray nozzles. A description of each of the plants visited is presented. Photographs and sketches are included.

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FIAT REPORT NO. 592

UNCLASSIFIED

HOT ROLLING OF SPECIAL SHAPES. Reported by: S. Tour
8p.

The hot rolling of steel into special shapes has reached high degree of advancement in Germany. The procedure followed for the rolling of special shapes was investigated at two plants: The Ruhrstahl-Gussstahl Werke at Witten and then Kloeckner Werk A.G. at Troisdorf, near Cologne. At the Ruhrstahl plant, it was found that they had developed a method of producing steel spar flanges for aeroplane wings as substitute for forged aluminum spars. A description of this process is included but the sketches referred to therein are lacking. In the roll making department of the Kloeckner Werk is a large engraving section. Intricate roll designs are hard engraved into the rings or sleeves in the annealed condition. After engraving the rings are heat treated and shrunk and keyed to the roll bodies. Process in roll turning department and method of forming products from hot rolled shapes are described. Pamphlet on beater bars mentioned in text is not included in report.

METALLURGY

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FIAT REPORT NO. 595

UNCLASSIFIED

BI-METAL TUBING. Reported by: S. Tour. 7p.

Steel tubing lined with copper or bronze is produced by two different methods in at least two plants in Germany. The Osnabrücker Kupfer u Drahtwert at Osnabrück is one of the plants producing steel tubing with plating or cladding both inside and out. The Vereinigte Deutsche Metallwerke Hedderneim is the firm producing steel tubing with a bronze inner-lining only. The Osnabrücker operation uses a piece of steel tubing as a starting blank, whereas the V.D.M. Hedderneim uses an extruding operation to produce the initial blank steel tubing already lined with bronze. Both methods are described.

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FIAT REPORT NO. 597

UNCLASSIFIED

BRONZECOATINGS ON STEEL GEARS. Reported by: S. Tour.

2p.

Some copper alloys containing 5 to 20 percent tin are used for bronze gears. The higher the tin content, the harder is the alloy and also the more brittle. Solid bronze gears do not have the strength of steel gears. A Dr. Burchart of the VDM, Hedderneim Co., has invented a method of producing tin bronze coatings on steel gears to provide a layer of good bearing metal quality on the surface of a steel gear of adequate strength. The method, which is described in the report, can be applied to other shapes than gears.

METALLURGY

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FIAT REPORT NO. 598

UNCLASSIFIED

HOT EXTRUSION OF STEEL PIPE. Reported by: S. Tour. 3p.

The practice of the Mannesman Company at Witten, Germany, in the production of steel pipe of the type normally used for gas, water and steam piping is to extrude blanks in a vertical press. The process, tools, dies, containers and liners for containers are described in this report.

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FIAT REPORT NO. 599

UNCLASSIFIED

ALCLAD ALUMINUM ALLOY EXTRUSIONS. Reported by: S. Tour. 2p.

The high strength aluminum alloys containing copper have low corrosion resistance. To provide corrosion resistance a layer of pure aluminum applied on the top surfaces results in a product of considerable advantage. This is called cladding and the term alclad is used to designate this type of material. At the plant of the Vereinigte Deutsche Metallgesellschaft a method has been developed of extruding angles and other sections and shapes in which a composite billet of pure aluminum and of the alloy aluminum is fused, and these shapes in alclad form are produced. A description of the process is presented.

METALLURGY

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FIAT REPORT NO. 686

UNCLASSIFIED

CASTING METHODS FOR ALUMINUM AND ALUMINUM ALLOY BILLETS.
Reported by: S. Four. 17p.

Descriptions are given of methods used for melting and casting of aluminum and aluminum alloy billets and slabs for hot extrusions and hot rolling in the following plants in Germany: Felten and Gillums, Carlswerk, Mühlheim near Cologne; Dürener Metallwerk A. G., at Düren; Rheinmetall-Borsig, at Grafenberg near Dusseldorf; Messingwerk-Unna A. G., Unna; Vereinigte Leichtmetall Werke, Bonn; Aluminum GmbH, Rheinfelden; Aluminum Walzwerke Wutöschingen, GmbH, Wutöschingen, Baden; Aluminum Walzwerke GmbH, Singen; Wieland Werke, Vöhringen/Iller; Vereinigte Deutsche Metallgesellschaft, Heddernheim. Drawings are included.

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FIAT REPORT NO. 695

UNCLASSIFIED

POTASSIUM METAL VIA THERMIC REDUCTION. Reported by: J. S. Smatko. 21p.

This report describes the production of potassium by the thermic reduction of potassium salts. This process has successfully supplanted electrolytic production in Germany. Descriptions are given of the old type process which used KF and CaC_2 on a batch basis and the new type process using KF and K_2CO_3 and Si as the reductant. The later method can be run almost continuously. I. G. Farben-

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FIAT REPORT NO. 697

UNCLASSIFIED

RHENIUM. Reported by: F. R. Hensel. 4p.

Most of the new rhenium alloys were produced by Degusse Siebert Zweigniederlassun, Hanau, and are discussed in this report. Alloy A (60% rhenium, 15% nickel, 15% platinum or ruthenium, and 10% tungsten) is the most popular for pen-points. Other alloys used for this purpose are alloy B (90% rhenium, 6% tungsten, 3% tantalum, and 1% nickel or cobalt) and alloy C (75% rhenium, 25% platinum and 5% cobalt or nickel). Alloy D (95% platinum and 5% rhenium) was used for platinum base electrodes in electro-chemistry; and alloy E (3.5% rhodium, 5.4% rhenium and the balance platinum) was used for thermocouples in place of the standard platinum-rhodium alloy. The possible use of rhenium for catalysts was considered but no actual experiments were carried out.

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FIAT REPORT NO. 699

UNCLASSIFIED

MAGNESIUM DETERMINATIONS IN ALUMINUM. Reported by: S. Tour. 2p.

Two different plants in Germany claimed to have developed modifications of the standard method of determining magnesium in aluminum in less time than ordinarily taken. One method permits several determinations be made at one time. Diagram and drawing illustrate this.

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FIAT REPORT NO. 727

UNCLASSIFIED

THE KRUPP-RENN PLANT AT SALZGITTER. Reported by: W. M. Pollitzer. 9p.

A short history of the Hermann Göring Works in Salzgitter, Germany, and the reasons for the utilization of low grade siliceous iron ores is followed by a summary of the various methods of ore preparation at Salzgitter. The report deals in detail with the Krupp Renn method, a roasting reduction process by which a product with 95% Fe is manufactured in a 70 meter long rotary kiln. Conditions for economic usage of the Krupp-Renn process are discussed. Two flow sheets and cost figures at the Krupp-Renn plant are included.

Item No. 21

FIAT REPORT NO. 731

UNCLASSIFIED

TECHNOLOGY OF ALUMINUM AND ALUMINUM ALLOY PRODUCTION IN GERMANY INCLUDING EARLY FABRICATION AND RECOVERIES FROM SCRAP. Reported by: A. Cunningham. 135p.

This is an extensive report on aluminum and aluminum alloy production in Germany during the war years. The data contained herein were obtained by means of visits to twenty-three German plants engaged in one phase or another of the aluminum industry, interviews with plant personnel, technical papers published recently in Germany, and data obtained from the reports of other American and British investigators who have covered parts of the aluminum field. Production of aluminum from bauxite, production of silumin and hydronolium, and the recovery of aluminum alloys from scrap are among the topics covered. The only perfected process for recovering aluminum from domestic materials was in the production of "Silumin", a trade name for alloys of aluminum and silicon produced from kaolin. During the war the Germans revived and perfected alloys of the Al-Zn-Mg series. Extended data are presented on this subject.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 733

UNCLASSIFIED

VERTICAL RETORT ZINC AND BY PRODUCTS. Reported by: W. C. Aitkenhead. 33p. Deals with the vertical retort zinc plant with auxilliary plants at Oker near Goslar. Preparation of the ore, sintering, reduction, refluxing of the zinc, and residue treatment are discussed, and tabular data are given. Brief descriptions of process used for the production of cadmium, thallium indium, antimony, zinc sulphate and copper culphate are included.

Item No. 21

FIAT REPORT NO. 738

UNCLASSIFIED

THE PRODUCTION OF SOME RARE METALS AND THEIR COMPOUNDS AS PRACTICED BY E. MERCK, CHEMISCHE FABRIK, DARMSTADT: BARON, CAESIUM, GALLIUM, GERMANIUM, RUBIDIUM. Reported by: J. S. Smatko. 13p.

E. Merck of Darmstadt prepared small quantities of both crystalline and amorphous boron for pen point alloy manufacturers. Small amounts of germanium and gallium metal and their compounds likewise were made. The preparation of caesium and rubidium involved larger apparatus than did the preparation of the others because the raw materials were low in Cs and Rb content. The processes of all these are described in the report. The properties and uses of the elements and their compounds are listed.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 750

UNCLASSIFIED

RARE AND MINOR METALS. Reported by: P. M. Tyler. 19p.

The purpose of this report was to afford a comprehensive picture of the rare metal industries in Germany. It reviews data in certain previous reports, but most of the data given was obtained as a result of a questionnaire submitted by the author to Dr. Hans Joachim Heine, of Metallgesellschaft, Frankfurt a/Main. In general the rare metals industries made little progress in wartime Germany, but there were some new developments. Production, uses, names of producers and users, and other data are given for the following: Barium, bismuth, boron, caesium and rubidium, calcium, cerium, gallium, germanium, hafnium, indium, lanthanum, lithium, manganese, masurium, niobium (columbium), polonium, potassium, rhenium, selenium, sodium (metallic), strontium, tantalum, tellurium, thorium, titanium, uranium, and zirconium. A list of reports covering production methods followed in Germany for certain of these metals is included.

METALLURGY

Item No. 21

FIAT REPORT NO. 755

UNCLASSIFIED

HIGHLIGHTS OF GERMAN IRON AND STEEL PRODUCTION TECHNOLOGY.
Reported by: P. M. Tyler. 113p.

This survey of the process metallurgy of the German iron and steel industry during World War II is based on interviews with German officials and metallurgists, personal visits to selected plants, and a partial review of reports of other American and British investigators supplemented by the study of numerous unpublished documents and a limited search of published literature. The report contains a discussion of the economic background of the German iron and steel industry, details of pig iron manufacture, raw steel manufacture, and the alloy steel situation. Tables present statistics of production. Four appendices are included, being translations of German articles on metallurgical processes and a comparison of German and American costs.

Item No. 21

FIAT REPORT NO. 767

UNCLASSIFIED

GERMAN RESEARCH ON ZINC BASE BEARINGS. Reported by: F. R. Hensel and /W. M. Pollitzer. 16p.

Zinc based bearings have been used in Germany in considerable quantities. Thus, quality in many cases equals the performance of standard bearing alloys, particularly if 30% Al is added. Test results of zinc based bearings with additions of Cu, Al, Mg, Sn, Pb Ni, graphite, Si and different qualities of zinc have been listed. For FIAT Microfilm Reel MM-117 containing seven original German documents on this subject, see PB 17693. For the three enlargement print documents available therefrom, see PB 34979-34981.

METALLURGY

Item No. 21

FIAT REPORT NO. 772

UNCLASSIFIED

GERMAN POWDER METALLURGY. Reported by: G. J. Comstock.
128p.

This report covers the German powder metallurgical industry as observed by Dr. Gregory Comstock during the summer and fall of 1945. Hard sintered carbides, their manufacture by the hot press method, their compositions and uses for projectile cores and cutting tools are described. The manufacture of metal powders, especially of ferrous metals is dealt with and German methods of manufacturing parts from the powders are discussed. A description of the manufacture of shell rotating bands is included. The report contains eight tables, seven flow sheets and 31 figures. This report, originally listed in v. 3, p. 36, this Bibliography, has been completely revised and a great amount of material eliminated to facilitate its publication. Translations from German reports were rewritten into readable English. Material of little technical value, including statistical data, photographs and translations of uncertain meaning, were discarded, as well as certain drawings too indistinct for reproduction.

METALLURGY

Item No. 21

FIAT REPORT NO. 773

UNCLASSIFIED

TITANIUM PRODUCTS IN GERMANY. Reported by: F. H. Mcberty.
63p.

Titanium dioxide manufacture in Germany is described, and production and sales data are given, the only manufacturer being Titangesellschaft m.b.H, Leverkusen. Research accomplishments are outlined and patent applications abstracted. References are cited concerning vitreous enamels based on titanium dioxide (V-26 flux); use of the latter in welding rod coatings, dielectrics, and semi-conductors; and use of cemented titanium carbide in cutting tool tips. Among the appendices are patents and patent applications of Titan-gesellschaft m.b.H.; drawings showing details of calcina-tion kiln; and statistics from annual reports of Titangesell-schaft. Some pages of this typewritten report may not photograph well.

Item No. 21

FIAT REPORT NO. 782

UNCLASSIFIED

THE PRODUCTION OF DENSE, NON-POROUS BRONZE CASTINGS. Re-ported by: E. R. Thews. 15p.

The causes of porosity in bronze castings are discussed. The chief reason usually is the presence of gases in the bronze after its solidification. Twenty-five rules for minimizing the danger of porosity are given.

METALLURGY

Item No. 21

FIAT REPORT NO. 785

UNCLASSIFIED

ELECTRICAL CONTACTS. Reported by: F. R. Hensel. 31p.

The composition, properties, and production of German contact alloys and the companies which produce them are discussed. Alloys of gold and zirconium; beryllium and platinum; tungsten and platinum have been developed to replace iridium alloys. Methods used for bonding inlays and overlays to inexpensive basic metals are given. In general practices similar to those known in the United States are utilized. A number of platinum, gold, and silver alloys developed as substitute materials have given satisfactory performance. The firms surveyed include the following: Degussa Siebert, Hanau; W. C. Heraeus, Hanau; G. Rau, Pforzheim; Deutsche Edelmetallwerke, Berlin-Metallwerk Plansee, Reutte; Siemens, Berlin; Osram, Berlin; Richard Schier, Berlin; and Dr. Durrwachter, Pforzheim. For each firm, a list of contact materials and manufacturing methods are given. Appendices contain a classified list of manufacturers and several DIN sheets on contact rivets.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 787

UNCLASSIFIED

PRECIOUS METAL REFINING AND FABRICATION BY W. C. HERAEUS
AND G. SIEBERT PLATINSCHMELZE OF HANAU. Reported by:
J. S. Smatko. 27p.

This report describes the refinement of precious metals from scrap and residue, as operated by the Heraeus and Siebert firms. Examples of alloy compositions and application of these alloys are included. The chemical treatment of the starting materials is presented in complete detail. Thereafter, the products manufactured from the refined metals and alloys are discussed, together with the processes, where unusual development existed. The refining of platinum and metal evaporation have been amplified as completely as possible. A listing of Siebert prewar production is included. A bibliography, sketches, and photographs are appended.

Item No. 21

FIAT REPORT NO. 792

UNCLASSIFIED

IRON CORES. Reported by: F. R. Hensel. 12p.

German methods for the manufacture of low hysteresis iron and iron-nickel powder cores are given. Special emphasis is placed on insulation and bonding. Manufacturing details and theoretical considerations of hysteresis are given in tabular form at the end of the report.

METALLURGY

Item No. 21

FIAT REPORT NO. 795

UNCLASSIFIED

LANTHANUM, NEODYMIUM, PRASEODYMIUM AND URANIUM COMPOUNDS
PREPARED BY AUERGESELLSCHAFT, BERLIN. Reported by: J. S.
Smatko. 6p.

This report describes the methods used by Auergesellschaft, Berlin, for producing commercial lanthanum, neodymium, praseodymium compounds from monazite sands and uranium compounds from pitchblende and describes the laboratory methods for production of very pure compounds. It also compares the German and U. S. practices and reagents used in uranium purification. A diagram shows the fractional crystallization scheme used by the firm.

Item No. 21

FIAT REPORT NO. 798

UNCLASSIFIED

TITANIUM METAL PRODUCED BY DEGUSSA AND OSRAM. Reported by:
J. S. Smatko. 10p.

This report covers process descriptions illustrated by sketches of the production of titanium metal (a) by Degussa reducing $TiCl_4$ with metallic sodium, (b) by Osram thermally decomposing $TiBr_4$ and (c) by Osram reducing TiO_2 with calcium hydride. Also included are recent production figures and diagrams.

METALLURGY

Item No. 21

FIAT REPORT NO. 799

UNCLASSIFIED

KRUPP-RENN AND OTHER PROCESSES FOR UTILIZING LOW-GRADE IRON ORES IN GERMANY. Reported by: P. M. Tyler and W. M. Pollitzer. 29p.

The historical background of iron ore reduction by other means than blast furnace is given. The Krupp-Renn process is discussed, the behavior of impurities is treated, costs and operating details are analyzed. The application of the Krupp-Renn process to ferronickel and nonferrous metals is given in Appendix A. The dressing of iron ores in Germany is discussed. It is concluded that for normal ores blast furnace smelting is still the optimum method. For truly high-silica ores, the Krupp-Renn process possesses a number of important advantages. Several tables are included.

Item No. 21

FIAT REPORT NO. 805

UNCLASSIFIED

GERMAN RESEARCH ON EXPERIMENTAL ALUMINUM -BASE BEARINGS. Reported by: F. R. Hensel and W. M. Pollitzer. 4p.

Aluminum based bearings with lead and cadmium additions were developed at VDM, Heddernheim. Analyses of the principal bearings, heat treatment, etc, are given. A complete list of experiments and tests conducted at Karl Schmidt, Neckarsulm, of aluminum based bearings with all kinds of alloying elements is affixed to the report.

METALLURGY

Item No. 21

FIAT REPORT NO. 807

UNCLASSIFIED

LITHARGE AND RED LEAD PROCESS. Reported by: F. H. Mcberty.
20p.

This report outlines the process and describes in some detail the equipment sold by the large equipment manufacturer, Kloeckner-Humboldt-Deutz A. G., of Cologne-Kalk, Germany, for the manufacture of "raw" and "calcined" litharge and of red lead, starting with pig lead. So-called "raw" litharge of greenish yellow color is made as the first stage of the process. This material is subsequently calcined to give the canary yellow grade of "calcined" litharge, which in turn is furnaced to make red lead of desired shade and properties. For best quality products it is believed necessary to start with "virgin" pig lead, it being stated that recovered lead of the same chemical analysis does not give equal product quality. The litharge is widely used from chrome yellow. Flow diagrams of the process and diagrams of the litharge and red lead furnaces are also included.

METALLURGY

Item No. 21

FIAT REPORT NO. 821

UNCLASSIFIED

ZINC, MANGANESE AND OTHER METALS RECOVERED BY AMALGAM PROCESS AT DUISBURGER KUPFERHUTTE. Reported by: W. C. Gardiner. 23p.

The purpose of this investigation was to determine how the Duisburger Kupferhütte was proposing to make 99.999% zinc. A new metallurgical tool was developed by Duisburger Kupferhütte for those metals that are soluble in mercury. This report covers a series of interviews with the two men who had most to do with developing the process under investigation. The process is reported for the recovery of 99.999% zinc and chlorine from the leach liquor obtained from pyrite cinders after chloridizing roast. It describes the preparation of pure zinc chloride solution. Two electrolytic cells are used with zinc amalgam being the cathode in one and anode in the other. The overall current efficiency is 80% at a total of 4.0 volts. A similar process for manganese, lead, tin, cadmium and thallium is briefly described. Charts, sketches, and flowsheets are included. The bibliography of the report mentions certain "Miscellaneous chemicals" or "MC" drawings and documents. Of these, MC302-305 and MC 308 are reproduced in the document. For Chlor-Fako Report No. 3, see FIAT Microfilm Reel C - 87, frames 1311-1313, PB 30381, abstracted in v. 2, p. 721 of this Bibliography. For MC 209 see PB 24928, v. 1, p. 1453. For MC 256 see PB 41149. For MC 300, 306-7 and 309, see PB 46412, PB 46411, PB 46427, and PB 41119, respectively, entered under Duisburger Kupferhütte. For other documents issued by OTS regarding the Duisburger Kupferhütte, see FIAT Microfilm MM 106, PB 20862, abstracted in v.3, p. 572, especially the following enlargement prints taken therefrom: PB 41418-PB 41422, PB 41459, PB 41481 = PB 41483.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 823

UNCLASSIFIED

UTILIZATION OF BLAST FURNACE SLAG IN GERMANY . Reported by:
G. W. Josephson. 36p.

This report by a representative of the Technical Industrial Intelligence Division Branch, U. S. Department of Commerce, describes briefly the various ways in which Germany utilized its blast furnace slag. Lump, cast crushed, fertilizer, granulated and foamed slags are considered. Special attention is given to the production of blast furnace cements and slag wool. Twenty-two figures and graphs are included in the report.

Item No. 21

FIAT REPORT NO. 829

UNCLASSIFIED

NON-FERROUS METAL PRODUCTION PROCESSES IN THE HAMBURG DISTRICT. Reported by: W. C. Aitkenhead. 28p.

This report gives methods of preparing pyrite cinder for blast furnace feed with special consideration for the recovery of copper, zinc, silver, gold, cobalt, lead, and Glauber salt. The smelting of nonferrous metals is briefly considered. No new processes have been developed in the smelting of scrap bronze and brass, but interesting refinements are noted. Two sketches and five flow sheets are included, together with a bibliography.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 837

UNCLASSIFIED

ANEALING, PICKLING, WASHING AND LIMING OF ROLLED STEEL WIRE. Reported by: E. R. Thews. 15p.

Economical and technically satisfactory methods of scale removal from wire are discussed. Control of sulphur and carbon in the furnace gases, selection of most satisfactory pickling methods, and proper liming and elimination of hydrogen brittleness are emphasized. A brief bibliography is appended.

Item No. 21

FIAT REPORT NO. 869

UNCLASSIFIED

A NEW METHOD OF BENEFICATION OF LOW GRADE IRON ORE BY THE WIEDELMANN WASHING TOWER. Reported by: J. V. N. Dorr. 12p.

This report describes a new method of concentrating low grade iron ore by means of a washing tower developed by Ing. Wiedelmann of Ilsederhütte. Details of the washing tower and of the flow sheet used are presented. Two sketches illustrating the method used are included. Data on experimental and commercial plant operations are given. The equipment and flow sheet used in this process are covered by German patent 713347, issued September 25, 1941.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 869 Supplement

UNCLASSIFIED

NEW METHOD OF BENEFICIATION OF LOW GRADE IRON ORE BY THE WIEDELMANN WASHING TOWER. Reported by: J. V. N. Dorr. 2p.

Completion of drawing FIAT final report No. 869 figure 2, page 6, "Washing Tower, 1000T Capacity" in the original report lacks reference letters referred to in the description of the apparatus. Herewith is included the same sketch with the reference letters inserted.

Item No. 21

FIAT REPORT NO. 876

UNCLASSIFIED

CONTINUOUS CASTING OF METALS IN GERMANY. Reported by: G. T. Motock. 9p.

This report gives a general discussion of continuous casting of metals in Germany, lists companies operating under the patent pool agreement, and includes the numbers of German and foreign patents held by the pool. Over 120 patents were controlled. The principal plants visited were Siegfried Junghaus, Schorndorf, Vereinigte Deutsche Metallwerke, Heddernheim, August Thyssen-Hütte, A. G., Duisburg-Hamborn, and Ruhrstahl A. G., Gusstahlwerk, Witten. Appendices contain a list of personnel interviewed and a bibliography.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 877

UNCLASSIFIED

SELECTION AND APPLICATION OF MOLD-AND CORE BLACKWASHES.

Reported by: E. R. Thews. 15p.

Mold- and core blackwashes are required to prevent burning of the mold and core materials as well as scabbing and scoring of sand and castings. They thus form very important factors in foundry routine in spite of the scant attention frequently paid to this phase of the molder's work. This report discusses imperfections of castings due to the poor choice of blackwashes. Experiments on the reduction of permeability of washes are discussed. Thorough mixing and appropriate type of wash for a specific purpose are emphasized. Figure 1 shows a fully mechanical stirring device suited to the requirements of large foundries. This report should be of value to foundry men.

Item No. 21

FIAT REPORT NO. 878

UNCLASSIFIED

MELTING AND CASTING OF GERMAN SILVER ALLOYS. Reported by:
E. R. Thews. 23p.

This report treats German silver alloys, their composition, the effects of modifying metals, and especially melting, molding, and casting practice. German silver alloys are alpha-brasses in which part of the copper, and sometimes part of the zinc, is replaced by nickel. They are considered straight-brasses containing nickel by some and copper-nickel alloys containing zinc by others. A list of alloys is included, together with a bibliography.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 879

UNCLASSIFIED

NOTES ON THE PEELING OF NICKEL DEPOSITS. Reported by: E. R. Thews. 24p.

This report lists twenty-one causes of peeling of nickel electro deposits and discusses means for their correction. Symptoms for the diagnosis of the cause of difficulties are discussed. A bibliography is appended.

Item No. 21

FIAT REPORT NO. 880

UNCLASSIFIED

DROSS PRODUCTION IN METAL GALVANIZING. Reported by: E. R. Thews. 34p.

Twenty-five of the most important factors influencing the formation of hard zinc and dross in hot-dip galvanizing are discussed. The report contains nine tables and one graph, together with a bibliography and list of allied and German patents. The author is a German consulting engineer.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 907

UNCLASSIFIED

REVIEW OF RECENT GERMAN DEVELOPMENTS IN ALUMINUM REFINING.
Reported by: W. C. Aitkenhead. 64p.

Operating and proposed aluminum refining processes are based on: (1) Purifying with another metal such as magnesium, mercury, zinc, lead or manganese, (2) oxidation for the removal of magnesium and calcium by chlorine, sulphur or oxygen, (3) volatilization of aluminum in a monovalent state and (4) the three layer electrolytic process. Although most of the processes described in this report were still in the laboratory or pilot plant stage of development, the report should be of value to aluminum metallurgists interested in refining. Sketches, illustrations and charts are included.

Item No. 21

FIAT REPORT NO. 909

UNCLASSIFIED

THE CERIUM METAL AND LIGHTER FLINT INDUSTRY IN GERMANY AND AUSTRIA. Reported by: J. A. Livingston and H. Kent.
15p.

This report describes processes employed in manufacturing cerium (misch) metal and ferro-cerium lighter flints. Information is also given in regard to the use of cerium (misch) metal in alloys. Some statistics are given concerning production of these materials. The following plants were visited: Auergesellschaft, Berlin; Berliner Gasglühlicht Werke; Th. Goldschmidt A.G., Essen; Prometheus Kempten, Allgaeu, Bavaria; Pyrophor Metallgesellschaft A.G., Essen-Werden; Treibacher Chemische Werke A.G., Treibache-Kaernten. There is attached a translation of a German report originating at the I. G. Farbenindustrie plant in Bitterfeld, being a "Description of the production of cerzündmetall", which is an alloy of mischmetall, iron, copper, magnesium and tin, having the technical designation "Zündmetall" and the trade name "Zündstein". For a related report see BIOS Final Report 400, item 21, PB 44948, Cerium industry in German territory, including reports on radium and mesothorium.

METALLURGY

Item No. 21

FIAT REPORT NO. 927

UNCLASSIFIED

PRODUCTION OF HIGH ALUMINA SLAGS IN BLAST FURNACES AND ALLIED PROCESSES FOR RECOVERING ALUMINA. Reported by:

J. T. Kemp. 34p.

Processes for the production of high alumina slags suitable for leaching by the Bayer process are discussed. The two blast furnace processes which have met with some success are a process used in Russia using a B.F. charge of coke, bauxite, steel chips, and limestone, and the TRV process (Alumina - pig iron combined process). The report is composed largely of translations of documents picked up from the files of the Metallurgical Department of the "Leipziger Leichtmetall Werke in Rackwitz, Saxony." At the end of the report are 13 figures of heat and material balances illustrating the TRV process, and a bibliography.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 974

UNCLASSIFIED

THERMOSTATIC BIMETAL PRODUCTION IN GERMANY. Reported by:
H. W. Boessenkool. 22p.

This report reviews the field of German practice in the manufacture of thermostatic bimetal. The art of making these metals, as well as the technique of applying them, is less advanced than in the United States according to the report. Methods and equipment used for preparation of component metals, bonding, rolling, annealing, slitting and pickling are indicated. Specifications of component metals used and of bimetals produced by two main manufacturers, Heraeus Vacuum Schmelze, Hanau and G. Rau, Pforzheim, are given. Two other firms produced small quantities. They are Vereinigte Deutsche Nickelwerke A.G. Schwert and G. Kuhbier und Sohn, Dahlerbruch. Chrome-nickel alloys were avoided. No significant development nor promise of one in the near future was discovered. Two graphs and a sketch of water-cooled copper mold are included.

Item No. 21

FIAT REPORT NO. 975

UNCLASSIFIED

ROLLED GOLD PLATE PRODUCTION IN GERMANY. Reported by:
H. W. Boessenkool. 12p.

Reviews the field of German practice in the manufacture of rolled gold plate and allied materials. Indicates methods and equipment used for bonding, rolling, annealing and trimming. Almost total destruction of every manufacturing plant in Pforzheim (where five of eleven plants were visited) interfered with any detailed inspection but the general impression was that neither processes nor equipment used prior to the bombing had much of interest to U.S. plate manufacturers. Practically all manufacturers alloy and cast their own gold. Most of them purchase their base metals, although one firm casts their own wire bars.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 979

UNCLASSIFIED

SINTERED IRON SHELL ROTATING BANDS. Refer to Item No. 2 for a complete listing of this report.

Item No. 21

FIAT REPORT NO. 986

UNCLASSIFIED

CARBON ELECTRODES IN GERMANY FOR THE ALUMINUM REDUCTION INDUSTRY. Reported by: A. J. Rice and F. C. Frary. 14p.

The section of the German carbon electrode industry concerned with the production of prebaked electrodes used in the electrolytic reduction of aluminum is reviewed for the purpose of amplifying, as regards equipment, practices, and processes, those prior reports issued on the same and related subjects. A description is given of equipment and practices at the C. Conradt plant, Kolbermoor near Rosenheim, Bavaria. Engaged in the graphitizing of carbon electrodes, the use of which is usual practice in certain processes related to aluminum manufacture. Appendixes include a bibliography and a list of German plants visited.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 989

UNCLASSIFIED

ALUMINA PRODUCTION IN GERMANY. Reported by: F. C. Frary and A. J. Rice. 12p.

With the exception of one inaccessible plant in the Russian zone, all the major German plants which manufactured alumina for the aluminum industry were visited and their practices studied and compared. The following plants were visited: V.A.W. Nabwerk, Schwandorf, Bavaria; V.A.W. Lippewerk, Luenen; Gebr. Guilini G.m.b.H., Mundheim near Ludwigshafen/Rhein; and Tonerdewerke Martinswerk, G.m.b.H., Bergheim. All employed the type of Bayer process adapted to their European (monohydrate) bauxites, but there were many variations in the details of equipment and operation. The general process is described and these variations discussed. They chiefly involve the questions of the desirability of precalcining the bauxite, the time, temperature and caustic strength used in the digestion, and the precipitation conditions. The "tower" continuous Bayer process for the extraction of alumina from coarsely crushed bauxite is described, as are also the various processes used for making up the soda losses in the Bayer process, and uses for the red mud byproduct.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 992

UNCLASSIFIED

THE ELECTROTHERMAL PRODUCTION OF ALUMINUM SILICON ALLOY.

Reported by: F. C. Frary and A. J. Rice. 12p.

Luigi Thermie G.m.b.H., Horrem, Rheinland and Vereinigte Aluminum Werke, Pockwerk, Pocking, Bavaria were visited to study the electrothermal production of aluminum silicon alloy from kaolin, alumina and quartz, as practiced in Germany. Aluminum silicon alloys containing either 40 or 60% of aluminum were produced by electric smelting of kaolin with alumina and carbon. The charge composition and preparation, furnace construction and operation, and the subsequent refining and dilution of the alloy are described. The refined alloy was transferred to a holding furnace and diluted to 12.8-13.2% silicon with molten aluminum. The resulting alloy was sold under the trade name of Silumin, and "modified" before use by fluxing with a mixture of sodium chloride and sodium fluoride (according to patents of Dr. Aladar Pacz, who invented the modified alloy) or by adding a small amount of metallic sodium. The decision to produce the alloy electrothermally, instead of producing pure silicon and alloying it with pure aluminum, seems to have depended on governmental and trade policies and commercial relationships, rather than on actual production costs or consideration of quality, according to the report. Near the close of the war, it was decided to make pure silicon instead of aluminum silicon alloy at Pocking.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 993

UNCLASSIFIED

THE ALUMINUM REDUCTION INDUSTRY IN GERMANY. Reported by:
A. J. Rice and F. C. Frary. 24p.

The reduction of metallic aluminum from its oxide, alumina, as carried out in four large production plants and one small experimental plant in Germany, is reviewed in some detail. These plants represented over one-half of the virgin aluminum production industry available to the Germans during the war. There is also included a survey of that portion of the industry dealing with the electrolytic refining of aluminum from both primary metal and scrap, as carried out in two plants. It is the purpose of the report to amplify those prior reports issued on the same and related subjects, by supplying additional information regarding equipment, practices and processes. A list of previous FIAT reports on aluminum is included.

Item No. 21

FIAT REPORT NO. 997

UNCLASSIFIED

GERMAN RESEARCH IN THE LIGHT METALS INDUSTRY. Reported by:
F. C. Frary. 13p.

For the production of alumina from materials other than bauxite, the most promising acid processes were those using sulfuric and sulfurous acids. In the alkaline field a variety of processes based on calcination with calcium or sodium compounds (or both) and subsequent leaching were intensively studied, and some operated on a semicommercial scale. In the alloy field, the outstanding achievement was the development of a satisfactory heat-treated alloy containing four to five percent zinc and two to three percent magnesium, with stabilizing additions. Alloy development work on Silumin, magnesium-base alloys and aluminum magnesium alloys is also reported, with some work on bearing alloys. Bibliography.

METALLURGY

Item No. 21

FIAT REPORT NO. 1011

UNCLASSIFIED

FABRICATION OF ALUMINUM IN GERMANY. Reported by: C. F. Nagel, Jr. 31p.

As implied by the title, this report deals with some specialized German equipment, practices and technique developed and used during the war period and believed to possess sufficient merit to be of interest and value to the aluminum industry. An attempt is made to treat the selected subjects in enough detail so that the reader may be able to gain a knowledge of the practice under discussion sufficient to adapt it to his own purpose. Various phases of fabrication covered in the report include: Scrap Reclamation, Melting and Ingot Casting, Production of Sheet, Foil, Extruded Shapes, Tubing, Collapsible Tubes and Impact Extrusions, Sand Castings, Permanent Mould Castings and Forgings. Comparisons are made with American practices where such comparisons serve to emphasize or to clarify the subject under discussion. A list of German personnel interviewed, a list of German factories visited and a bibliography are included.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1030

UNCLASSIFIED

UBER DIE ELEKTRONENEMISSION KRISTALLINER METALLOBERFLACHEN
AND IHRE BEZIEHUNGEN ZU DEN GESETZMASZIGKEITEN DES KRISTALL-
BAUS. Reported by: I. N. Stranski and R. Suhrmann. 17p.

The results obtained from electron-emission research and
from crystallographic research on the single tungsten crys-
tal are compared critically. This results in three possi-
bilities of correlating the emission potentials and the
properties which characterize the crystal surfaces as such:

1. The work required for separation of the atoms; 2. the

atom-chain density; and 3. the specific surface energy.

Leads are given to permit a decision among these possibil-
ities on an experimental basis. At present, a relation be-
tween electron separation work and specific surface energy
seems particularly promising as basis for further considera-
tion. The conditions of atom separation work, as well as the
specific surface energies for the separate crystal surfaces
are calculated from it. It is notable that the ratio of
atom separation work from the boundary position to electron
separation work from the same position is 2:1.

METALLURGY

Item No. 21

FIAT REPORT NO. 1031

UNCLASSIFIED

ELECTRON EMISSION OF CRYSTALLINE METAL SURFACES AND ITS RELATION TO THE LAWS OF CRYSTAL STRUCTURE. II. SINGLE-CRYSTAL SURFACES WITH ADSORBED FOREIGN ATOMS. Reported by: I. N. Stranski and R. Suhrmann. 11p.

This is a report written by members of the "Kaiser Wilhelm Institut für Physikalische und Elektrochemie, Berlin". The crystal-geometric and energy laws by which foreign atoms are absorbed, are developed, based on experimental work on the electron emission of Cs- and Ba-coated tungsten crystals. Fundamentally, for each crystal surface certain laws of selection can be found from which it can be predicted which foreign atoms are able to form condensed films on a given surface. From the agreement of predictions and experimental results it also follows that Cs and Ba are absorbed on tungsten in the atomic and not in the ionic state. These considerations permit an easy classification of the adsorption and place-change energies for the adsorption of Cs on tungsten. According to this, the surface diffusion takes place essentially along step edges (hollow edges), and the measured activation energies are found to be equal to the separation work from edge breaks (hollow corners). Drawings are included. In German.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1061

UNCLASSIFIED

THE SMELTING OF ILMENITE IN GERMANY. Reported by: E. N. Kramer.. 57p.

Research is described on the smelting of ilmenite in a MgO lined batch rotary kiln in the presence of both carbon and a sodium hydroxide flux. The products are a high carbon content iron and a sodium titanate slag containing 60 - 70% titanium dioxide with a TiO_2/Na_2O mol ratio of 4/1. Such slags can be reacted with sulfuric acid and subsequently processed to titanium dioxide pigment. The research has not progressed far enough to evaluate reliably the yields and economics of the process, or to establish definitely the probable life of the magnesia refractory lining. Eleven appendices containing the following information: 1) list of German personnel interviewed; 2) list of German targets visited; 3) bibliography; 4) list of material evacuated; 5) Titangesellschaft patents and patent applications on ilmenite smelting processes; 6) chemical analyses on material used and produced in smelting operation; 7) laboratory reactions of slags and ilmenite with sulfuric acid; 8) production of titanium dioxide pigments from slag liquors; 9) flow sheets for pilot plant and for proposed semi-works units; 10) list and sketches of proposed kiln installation equipment; and 11) list of drawings--melting point curves for systems.

METALLURGY

Item No. 21

FIAT REPORT NO. 1062

UNCLASSIFIED

THE STÜRZELBERG PROCESS FOR MANUFACTURING PIG IRON. Reported by: E. Hladky. 30p.

The Stürzelberg process is described for the production of high grade iron by the smelting of low grade ores in a batch rotary kiln. A CaO/SiO_2 mol ratio of two is maintained and the resulting slag remains either solid or pasty throughout the operation. A special kiln installation is used which permits tilting of the kiln to discharge the molten iron and the slag at the end of the processing cycle. The process is justified economically only when a high grade of iron equivalent to Swedish pig iron can be produced from low grade iron ores. The process also has some application in cases where the special coking coals required for blast furnace operation are not available. A bibliography, list of German patents on the process, and a drawing of a projected Stürzelberg kiln are included.

Item No. 21

FIAT REPORT NO. 1098

UNCLASSIFIED

ETCH AND PERCUSSION FIGURES, AND TWINNING OF QUARTZ. Reported by: N. N. Padurow. 32p.

The present paper discusses the question of how quartz crystals occurring without well-developed crystal faces can be oriented. The orientation of the electrical and of the mechanical axes is described in their relative position to percussion and etch figures. The crystallographic details of the different twinning law developments are given. The Leydolt law, discovered in 1855, was found to apply to quartz crystals occurring near Shitomir (Ukraine). The sculpture of the quartz crystal faces gives an impression of the complicated growth of vicinaloids in good agreement with Kossel's general theory of crystal growth. Microphotographs, drawings and bibliography are included. Text is in German.

METALLURGY

Item No. 21

FIAT REPORT NO. 1101

UNCLASSIFIED

GERMAN METHODS FOR THE MANUFACTURE OF IRON POWDER CORES.

Reported by: H. L. Krebs. 15p.

This report deals with the manufacture of iron powder cores by the method practiced by several German companies. Manufacturing processes are given along with a list of the grades of carbonyl iron powder most generally used, their chemical analyses, electrical constants, and the electrical properties of the finished cores. Appendix 5 contains two tables, I. G. Farbenindustrie list of carbonyl iron powders and their characteristics.

Item No. 21

FIAT REPORT NO. 1121

UNCLASSIFIED

ALUMINUM BEARING ALLOYS AND THEIR DEVELOPMENT BY THE KARL SCHMIDT COMPANY AT NEKARSULM, GERMANY. Reported by: Dr. Ing. Carl Englisch. 155p. This report is a history of the work done at Karl Schmidt G.m.b.H., Neckarsulm on aluminum base bearings. Large numbers of experiments with all kinds of additions of such metals as Bi, Cd, Pb to the aluminum base, have been conducted. Cast bearings, as well as bearings pressed from aluminum powder (with and without graphite additions as lubricant), plated bearings (on steel and on aluminum), bearings in different engines and different speeds were tried over a period of many years. Although the report shows that Karl Schmidt put a great amount of effort and money into these experiments no final and conclusive results seem to have been achieved. The sensitivity of the bearing material, difficulties with lubrication, etc., prevented their use on a general and large production scale. The report indicates possibilities for a wide range of applications if and when the above-mentioned difficulties have been overcome. It might be mentioned that aluminum alloys are used at present for the connecting rod bearings of the V8 Ford (bearing type 411) and for the crankshaft bearings of the Volkswagen (type 83A). The peak production during the war amounted to 60,000 bearings per month.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1129

UNCLASSIFIED

GERMAN PRACTICE IN FABRICATION OF GAS TURBINE BLADES. Reported by: J. Robinson. 16p.

This report describes briefly three methods used at Bayrische Motoren Werke for fabricating turbine blades for gas turbines. Details of forming, drawing, machining, and mounting are given. Drawings and pictures give pertinent dimensions and illustrate various steps in the processes.

Item No. 21

FIAT REPORT NO. 1130

UNCLASSIFIED

THE MANUFACTURE OF SINTERED MAGNETS IN THE "MAGNETFABRIK DORTMUND" OF THE DEUTSCHE EDELSTAHLWERKE, A. G., KREFELD. Reported by: O. Guttman. 22p.

The object of this report is to give detailed information on sintered magnets manufacture as carried out at Reutte until the spring of 1945 and at the Dortmund plant since the fall of 1946. Other production methods than those used in Reutte are employed; these methods are covered in detail and compared with those of Reutte in this report. Charts, graphs, drawings and a bibliography are included.

METALLURGY

Item No. 21

FIAT REPORT NO. 1157

UNCLASSIFIED

THE PREPARATION AND REACTIONS OF ACROLEIN: DEUTSCHE GOLD-UND SILBER-SCHNEIDANSTALT (DEGUSSA) MOMBACH, CONSTANCE, AND FRANKFURT/MAIN. Reported by: W. F. Anzilotti. 29p.

(A) Acrolein was prepared in a 10-ton per month unit from acetaldehyde and formaldehyde over a sodium silicate catalyst at 300 to 325° C. An 80% yield at 45% conversion was realized (based on acetaldehyde). (B) The use of acrolein as an intermediate in the preparation of the following compounds is described: 1) a condensation product with pentaerythrit which resembles plexiglass, 2) preparation of methyl acrylate for which a 10-ton/month unit was designed but never completed, (3) preparation of formyldihydropyran (Dimerization), 4) condensation with ammonia to beta-picoline, or propylene-1,3-diamine, 5) reduction to allyl alcohol, or propionaldehyde, 6) condensation with vinyl cyanide, or methyl acrylate to give dihydropyran derivatives, 7) preparation of 1,6-hexanediol, and 1,2,6-hexanetriol, 8) preparation of alpha-hydroxy aldehyde, or glutaric acid, 9) preparation of 1,3-propylene glycol, and 10) preparation of acrisin, a wrinkle proofing agent used by Rohm and Haas in Darmstadt. Microfilm copies of the research reports mentioned in the text may be obtained under PB 73715 of the Bibliography. Various flow sheets, Figs. 1-6, pertaining to the text are appended.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1161

UNCLASSIFIED

REVIEW OF CENTRIFUGAL CASTING METHODS. Reported by: R. Schempp. 4p.

Operations at the Budernsche Eisenwerke at Wetzlar, which with the exception of coal, are entirely self sustained, are now confined to the making of centrifugally cast iron pipe for water and gas lines. The casting equipment is of the horizontal type with an inclination of about four percent per meter, and is practically automatic. The molds are of chromium-molybdenum steel, water-cooled, and are used without a refractory lining or coating. Pipe sizes range from 40 to 500 mm. inside diameter, three to six meters in length and wall thicknesses of four to 16 mm. In accordance with the desired wall thickness the rotating speed is varied from 420 to 1050 r.p.m. by the use of variable speed D. C. motors. During the war gun tubes were made, but the vertical type of casting equipment was used for this work. Apparently large scale production was not attained.

Item No. 21

FIAT REPORT NO. 1162

UNCLASSIFIED

STEEL PRODUCTION BY VACUUM ELECTRIC FURNACE AT HERAEUS VACUUMSCHMELZE, HANAU. Reported by: R. Schemppl. 6p.

The development of vacuum melting started with Dr. W. Rohn's work during World War I to replace noble-thermocouple materials (platinum etc.) with chromium-cobalt alloys. In view of the relatively high cost of melting in this manner, vacuum melting will be limited in its application to uses which require special considerations regarding: (a) Extremely close chemical composition limits (materials for radio tube construction and thermo-couple elements etc.); (b) absolute minimum of gas content for reasons of hot and cold workability and ultimate physical properties; (c) prevention of oxidation, i.e., loss of expensive alloying elements, which are readily oxidized; and (d) minimum of carbon content.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1165

UNCLASSIFIED

PRODUCTION OF MIXED STEELS IN GERMANY. Reported by: P. L. Getzinger. 6p.

This report describes the manufacture of the so-called mixed steels, which process is essentially the mixing in the ladle of suitable amounts of open hearth or converter steel with electric furnace steel to produce an end product of specified analyses and physical properties. Appendix I contains list of targets visited and personnel interviewed.

Item No. 21

FIAT REPORT NO. 1168

UNCLASSIFIED

THE "C" PROCESS OF MAKING MOLDS AND CORES FOR FOUNDRY USE. Reported by: W. W. McCulloch. 7p.

This report describes a new process for making sand molds and cores which are suitable for the production of precision castings in a wide variety of metals. The process is unique in its use of a plastic component which, under application of heat, bonds the sand grains together and forms a mold or core having unusual surface smoothness, high gas permeability, and dimensional stability. The process is especially suitable for the production of steel castings with very thin sections. Appendix I contains a list of German personnel interviewed, Appendix II photographs of various molds, pattern plate, cores and castings.

FIAT ITEM NO. 21

METALLURGY

Item No. 21

FIAT REPORT NO. 1195

UNCLASSIFIED

ALUMINUM PISTON ALLOYS (KARL SCHMIDT G.m.b.H., NEKARSULM, GERMANY. Reported by: C. Englisch. 39p.

This report gives German practices in light alloy piston design and discusses the properties of alloys used. It was prepared by one of the German authorities on internal combustion engines and presents useful data in graph form. The report should be of interest to American designers and manufacturers of internal combustion engines. A bibliography and illustrations are presented in Appendixes. The report is in German.

Item No. 21

FIAT REPORT NO. 1203

UNCLASSIFIED

UTILIZATION OF OXYGEN IN THE GERMAN IRON AND STEEL INDUSTRY. Reported by: W. M. Pollitzer. 26p.

Developments and advances in the practice of oxygen-enriched blast in the German iron and steel industry are described. In particular one blast German plant, one low shaft blast furnace plant and one converter plant are fully discussed and interesting achievements and data as well as novel ideas have been noted. Appendix I contains a list of German personnel interviewed, Appendix II a list of factories visited, and Appendix III a bibliography. Furnace drawings and photographs are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 8

UNCLASSIFIED

INVESTIGATION OF TEXTILES, I. G. FARBENINDUSTRIE, BOBINGEN.
Reported by: D. B. Wicker and G. P. Hoff. 11p.

This report details reactions in the polymer classes known as the polyesters, polyureas and polysulfones developed at this I. G. Farben plant. A considerable amount of fundamental research on amino caprolactum polymers was undertaken. Properties of end products are inferior to those of similar products in U. S. and Great Britain. With respect to yarn properties, nearly all of these materials are inferior to polyamides. Formulae and descriptions of processes are given.

Item No. 22

FIAT REPORT NO. 9

UNCLASSIFIED

INVESTIGATION OF SCIENTIFIC AND LABORATORY GLASSWARE, AREA OF THURINGIA, GERMANY. Reported by: H. A. Pringle. 7p

Information on production, calibration, and testing of scientific and laboratory glassware obtained from visits to 125 factories or shops. Principal factories visited were: Hohglashutte am Grenzhammer Otto Lange, Ilmenau; Julius Brückner & Company, Ilmenau, Eydam & Krieger, Ilmenau; Greiner & Friedrichs, Stutzerbach; and Gebr. Erhart, Schmiedefeld. Successful mass production of interchangeable ground glass joints depended largely on having the formed glass reach the grinder in uniform and nearly exact dimensions. Details of production of interchangeable ground glass pistons and barrels for hypodermic syringes at Schott and Gossen Company, Jena are given. Exhibits referred to in this report were forwarded to War Production Board.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 10

UNCLASSIFIED

CONTINUOUS PROCESS FOR SPINNING VISCOSE YARN AT ZELLWOLLE LENZING AKTIENGESELLSCHAFT LENZING, OBERDONAU, AUSTRIA.
Reported by: D. B. Wicker., 6p.

Details of an experimental machine for the production of continuous filament viscose yarn are given. The principles involved are covered from the mechanical standpoint by the Edward G. Budd - Furness patents. Motwurf's (of this firm's staff) patents involve chemical development aspects. Patents are listed. Plans are made to install a plant with 5,000 spinning positions. Photographs mentioned in this report were forwarded to Executive Secretary, Textile Subcommittee, Technical Industrial Intelligence Committee, Room 2241, Temporary Bldg. A, Washington, D. C.

Item No. 22

FIAT REPORT NO. 11

UNCLASSIFIED

VISCOSE PREPARATION FOR STAPLE FIBRE AT ZELLWOLLE LENZING, A. G. Reported by: L. H. Smith, J. J. Schilthuis, and D. B. Wicker. 7p.

This plant makes viscose staple fiber out of beechwood pulp made at the same location. The alkalicellulose process is continuous. Top capacity of this plant was stated to be 100 metric tons per day. The equipment and process are described in some detail. Several drawings and an operating data report in German mentioned in this report were forwarded to Executive Secretary, Textile Subcommittee, Textile Industrial Intelligence Committee, Office of Quartermaster General, Room 2241 Temporary Building "A", Washington, D.C.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 13

UNCLASSIFIED

MANUFACTURE OF SPINNERETS AT EILFELD, A. G., GROBZIG, GERMANY. Reported by: L. H. Smith and G. P. Hoff. 2p.

This plant makes spinnerets for many spinning companies. It uses the usual platinum-gold and tantalum metals, but also uses an alloy containing 1% manganese.

Item No. 22

FIAT REPORT NO. 15

UNCLASSIFIED

RESEARCH ON THE CYCLOPOLY OLEFINS AT I. G. FARBENINDUSTRIE GENDORF. Reported by: L. H. Smith. 3p.

This report deals with the production of cyclotetraoctaene and some of its homologs from acetylene. Further research may lead to a simple production of suberic acid, $\text{HOOC}-(\text{CH}_2)_6\text{COOH}$ which may be useful as a nylon intermediate. The details of the conversion from acetylene are given. Proof of structure of C_8H_8 is given and many other derivatives and reaction products discussed. PB 1 and PB 5 give results of some experimental uses of these cyclopolyolefins as therapeutic agents.

Item No. 22

FIAT REPORT NO. 16

UNCLASSIFIED

P. C. FIBERS, I. G. FARBEN, WOLFEN. Reported by: L. H. Smith. 3p.

The manufacture of P.C. (after chlorinated polyvinyl chloride) fibers is discussed. Military use as tent bottoms, tarpaulins and non-inflammable clothing is mentioned. It is also suitable as insect screening. P.C. fibers are of limited use in wearing apparel because of the low softening point (80°C). It is of special interest in industrial fabrics, however, because of its excellent resistance to water, acid, alkali, oils, bacteria, mildew and sunlight and its noninflammability. Spun staple P.C. yarns are preferred for filter fabrics because of much greater surface area. Continuous filament P.C. fiber is very highly thought of as fish nets. See also PB 1125.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 20

UNCLASSIFIED

TEXTILE RESEARCH DEPARTMENT, DR. ALEXANDER WACKER, GMBH,
BURGHAUSEN. Reported by: L. H. Smith. 4p.

The textile research department was found to be in operation and to have facilities for producing yarn by the cotton system and by the worsted system(continental). Since the number of steps in some cases appear some what less than are usual, a brief description of their equipment is given.

Item No. 22

FIAT REPORT NO. 31

UNCLASSIFIED

MANUFACTURE OF RAYON TIRE YARN, CORD AND FABRIC AT PIRELLI
S. P. A. AZIENDA TESSILE ARTIFICIAL, PIZZEGHETONE, ITALY.
Reported by: L. H. Smith, J. J. Schilthuis, and J. B.
Quig. 9p.

This plant makes high tenacity tire yarn, tire cord and tire cord fabric, the yarn reputed to be superior to any tire yarn made in Germany. A new type of Werner Pfleider Shredder of the coffee mill type was seen at this plant, possibly of interest in a continuous chemical spinning process. A two bath system in spinning is used and the setup is unique for the bobbin process. The doubling was done on a double thread twister developed and built by Barmag at Elberfeld, an important development in textile machinery. Supporting exhibits, photographs and drawings mentioned in this report were forwarded to Washington, D. C.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 34

UNCLASSIFIED

PREPARATION OF CUPRAMMONIUM SPINNING SOLUTION. PRODUCTION OF CUPRAMMONIUM STAPLE AND SPECIALTIES. RECOVERY OF COPPER AND AMMONIA AT I. G. FARBENINDUSTRIE, DORMAGEN. Reported by: G. P. Hoff. 14p.

The plant at Dormagen has a capacity of 40 metric tons per day of cuprammonium staple and 13 tons of cuprammonium yarn. Mattress fiber and spun dyed staple are produced as specialties. Cuprammonium staple has lower strengths and higher extensibility than viscose, and normal cuprammonium staple is claimed to be 10% to 20% higher than the median current cost of production of normal viscose staple. The texture and processing qualities of Cuprama (crimped cuprammonium staple) have resulted in a very favorable reception by woolen and worsted spinners.

Copper is recovered by a resin exchange process with an efficiency of 95% and ammonia is recovered by the Haltmeier process with a claimed efficiency of 80%.

Item No. 22

FIAT REPORT NO. 36

UNCLASSIFIED

STAPLE FIBER PRODUCTION, "VISTRA" NORMAL AND HIGH TENACITY AT I. G. FARBEN A. G., WOLFEN. Reported by: L. H. Smith 6p.

The plant was capable of producing normal staple and specialties such as high tenacity and wooly types. Capacity 60 metric tons per day. A simple system for receiving 30% of the CS₂ consumption was observed in use. A relatively simple machine for wet treatment of viscose rayon tow was in use, but floor space requirements were large. Hydrogen peroxide was added in the finishing treatment as a bleach. Extensive wet opening treatments were used. A Soromine was being used for finish. Drying was in a tunnel dryer operated partially up draft and partially down draft. Product is packaged and shipped as rolled picker lap of 150/75 kg package weight. Equipment and process is described in some detail.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 37

UNCLASSIFIED

PERLON U: POLYURETHANES AT I. G. FARBEN, BOBINGEN, AUGSBURG. Reported by: G. P. Hoff and D. B. Wicker. 5p.

Five methods have been investigated for the preparation of polyurethanes. These methods are described and the reactions indicated. Two of the methods are under pilot scale manufacture; Perlon U (hexamethylene diisocyanate and 1,4-butane diol) is made at Ludwigshaven and Höchst is developing the reaction of dichloro-carbonic esters of glycols with diamines. The former gives polymers more suited to fibers and bristles, the latter for plastics. The polymethanes show generally inferior properties to the polyamides. Perlon U is inferior to Nylon in the fiber field.

Item No. 22

FIAT REPORT NO. 38

UNCLASSIFIED

INVESTIGATION OF INSECTICIDE AND INSECTIFUGE RESEARCH AND MANUFACTURE IN WESTERN GERMANY. Reported by: L. B. Kilgore. 25p.

An investigation was made of the various methods for insect control in Germany. The study of the insecticide field revealed no new developments other than those previously reported by other investigators. Most of the work was with the DDT configuration and in this respect "Me 1700", "DDD" or "Lauseto" and "Gix" were developed. A few alkyl-aromatic sulfides and aromatic nitro compounds were found to be too toxic for warm blooded animals. The manufacture and testing of some of the insecticides is described. Tables list the action of many insecticides. A table shows the results of tests of fumigants with the Colorado beetle. A few insectifuges are considered, some of them being about as effective as phthallates. Nonphenol disinfectants, seed disinfectants, and thallium rodenticides are also considered.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 41

UNCLASSIFIED

THE CHARACTER OF SOME FINISHING AND AFTER TREATMENT AGENTS
I. G. FARBEN HOCHST. Reported by: J. J. Schilthuis and D.
B. Wicker. 7p.

The chemical nature of the I. G. finishing agents called Soromins as a class is discussed. The structures are given and uses and results obtained by their use indicated. The following Soromins are discussed:

Soromin A; A.F.; S.G.; B.S.; D.M.; F; S; N. powder; F.L.; F.L.O.; W.F.; A. Base.

Other research on finishers is also discussed: Persistol V.S. (or Hö 1/185); Hö 1/107; Hö 1/105; Hö 1/193; Kaurit W.F. 110; and other Kaurits and formaldehyde derivatives are also mentioned.

Item No. 22

FIAT REPORT NO. 42

UNCLASSIFIED

PERFORMANCE AND APPLICATION OF THE VARIOUS STAPLES IN
GERMANY ZELLWOLLE LEHR SPINNEREI, DENKENDORF, GERMANY.
Reported by: L. H. Smith. 9p.

The various staples manufactured in Germany are discussed from the standpoint of performance and application in the trade. Comments on protein, nylon, and P.C. staples are also included. The following subjects are also discussed: Staple diagram; future of cotton in Germany; future of continuous rayon in Germany; tow to top machines. A list of over 50 different staples made by various companies, and designated by manufacturer's trade names, giving physical properties of the staples is included.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 43

UNCLASSIFIED

I. G. BREAKING MACHINE FOR RAYON TOW IN THE WORSTED SPINNING INDUSTRY, DOHREN KAMMGARM SPINNEREI HANOVER.
Reported by: L. H. Smith and J. B. Quig. 3p.

A general discussion of the I. G. breaking machine for rayon tow. It did not produce a rayon top which is satisfactory for blending with wool tops in the worsted spinning industry. The machine apparently can be used successfully for the production of rayon tops which are eventually used in spun yarns going into heavy industrial fabrics, in which shrinkage is not too critical. A tow to top machine which cuts, as opposed to tearing or breaking the fibers, is indicated.

Item No. 22

FIAT REPORT NO. 44

UNCLASSIFIED

NEW FIBERS AND THEIR APPLICATIONS IN GERMANY DURING THE WAR PERIOD. Reported by: L. H. Smith. 7p.

Final compilation of interrogation in July 1945 of I. G. Farbenindustrie executives. The greatest progress was with Perlon, which belongs to the nylon family, and with polyvinyl chloride (P.C.); considerable progress has been conducted on the manufacture of fibers from other polymeric materials but none of these fibers have reached the production stage. Little progress has been made on the development of high tenacity saponified cellulose acetate fibers. The greatest research and development effort since 1938 has been centered in the rayon staple and tire yarn industries. See also PB 1117.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 48

UNCLASSIFIED

VISCOSE TIRE YARN MANUFACTURE AT I. G. FARBEN, ROTTWEIL, WURTEMBERG. Reported by: G. P. Hoff. 7p.

Final compilation of the interrogation in Aug., 1945 of Dr. Diem. This plant has attained a capacity of 9 tons of tire yarn, 690 den., per day. A simplified form of two baths spinning is used. As to quality, the resulting yarn is said to be a close second to Obernburger rayon tire cord.

Item No. 22

FIAT REPORT NO. 50

UNCLASSIFIED

GENERAL DEVELOPMENTS IN THE GERMAN STAPLE FIBER INDUSTRY AT I. G. FARBEN AND ZELLWOLLE UND KUNSTSEIDE, SCHWARZA, LENZING. Reported by: G. P. Hoff. 14p.

The Kalle plant is the largest producer of regenerated cellulose film in Germany. Bottle caps and bands and "Flake" acetate caps are produced by standard processes. "A.S.T." cellophane is described and production details, including coating formulas given. Report suggests that this formula should be considered by U. S. cellophane manufacturers, as being satisfactory for quick freezing industry. It is said to give good performance at low temperatures, yet stand sterilization at 140° C for two hours. Other films are also mentioned in this report.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 51

UNCLASSIFIED

COMPARISON OF GERMAN CONTINUOUS ALKALI CELLULOSE PROCESSES. VEREINIGTE GLANTZSTOFF, OBERNBURG AND KELSTERBACH SPINNSTOFF FABRIK, BERLIN-ZEHLENDORF. Reported by: D. B. Wicker. 5p.

The German industry has developed three continuous methods of producing alkali cellulose in connection with the viscose process, namely the screw press method of I. G. Farben, the Wolf vacuum filter method, and the sieve band method. All have been used successfully in practice but are subject to plus or minus 1% variation in cellulose content. Labor requirements are considerably less than with the conventional batch steeping process and much greater latitude in pulp requirements is permitted. A comparison of investment, labor and power requirements is given.

Item No. 22

FIAT REPORT NO. 53

UNCLASSIFIED

PHRIX KREFELD VISCOSE PROCESS DETAILS AT RHEINISCHE KUNSTSEIDE KREFELD. Reported by: J. B. Quig. 4p.

This report gives the details of the method of continuous viscose making used at this Phrix plant. The wet or dry pulp is cut up into a slurry and fed onto a screen which passes between rollers. The alkali cellulose is aged on endless belts and xanthated and dissolved in one operation in a kneter. Ordinary yarn is spun with only one godet, but strong yarn is spun with two godets and a series of two rollers.

The cakes are wrapped in covers and washed on a machine. Drying is done in a novel "merry-go-round" spiral dryer.

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FIAT REPORT NO. 56

UNCLASSIFIED

SULPHATE DISSOLVING PULP FOR RAYON MANUFACTURE KOSTHEIM, OBERNBURG, DARMSTADT. Reported by: D. B. Wicker. 6p.

Shortages of wood and sulfur in Germany and the need for a high tenacity rayon pulp other than refined spruce forced the development of sulfate pulps for viscose manufacture. In order to accomplish this, use was made of pre-hydrolysis, either with mineral acids or with water extraction of the wood to remove pentosans. The resultant sulfate pulp is reported to produce tire cord rayon of very good strengths and to compare in this respect with refined spruce sulfite. Although pine can be used it is felt that poplar is the most promising source of cellulose for this process as well as for sulfite dissolving pulp.

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FIAT REPORT NO. 59

UNCLASSIFIED

REGENERATED CELLULOSE FILMS AT I. G. FARBEN (KALLE) WIESBADEN-BIEBRICH. Reported by: G. P. Hoff and J. B. Quig. 6p.

Final compilation of interrogations made between June and August 1945 of officials of I. G. Farbenindustrie, Vereinigte Glanzstoff, Phrix Konzern, Zellwolle und Kunstseide. Considerable detail is given of the war use of pulps; of the continuous alkali cellulose processes to conserve iron and manpower; of the wear and laundering resistance, including formaldehyde and "Kaurit" or resin treatments; of water resistance and wool character; of specialty cellulose fibres; and of fully synthetic staple fibres such as Perlon and Pe-Ce.

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FIAT REPORT NO. 62

UNCLASSIFIED

I. G. WORK ON POLYAMIDES, I. G. FARBEN, LUDWIGSHAFEN.

Reported by: G. P. Hoff. 5p.

This report contains information obtained from Dr. Hopf on polyamides. The information obtained is an extension and elaboration of information previously obtained on the preparation of polymer intermediates and the polymers made therefrom. Products designated Igamide A,B, 6A, 1C, 85B, 40 B, 50 B and U had reached what could be called a commercial stage of development, the first two and the last being regarded as most important. A was preferred for molding and an outlet for B was foreseen in driving belts, bands, ribbons, gaskets, and buttons. Both A and B give yarns around 7 g.p.d. as the maximum. A lot of preliminary work had been done on the injection molding of combs, brushes, shoe trees, water "glasses", hardware for furniture, etc. They had made billiard balls and bowling balls and pins.

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FIAT REPORT NO. 65

UNCLASSIFIED

MANUFACTURE OF DISSOLVING PULP BY THE SULPHITE AND NITRIC ACID PROCESSES AT I. G. FARBENINDUSTRIE, WOLFEN. Reported by: D. B. Wicker. 12p.

The plant is described in some detail. The sulfite and nitric acid pulp processes used are given in full. Of interest are the following parts about the sulfite plant; 1. Beech wood chips used, 2. A 100 ton (metric) pulp mill has been integrated with a viscose rayon plant to produce, in part, a flake pulp containing 55-60 % moisture, 3. Unlined stainless steel digesters used,

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FIAT REPORT NO. 67

UNCLASSIFIED

CHEMICAL DEVELOPMENTS AND APPLICATIONS IN THE SYNTHETICS
INDUSTRY OF GERMANY. Reported by: A. Lyem. 77p.

This report presents the information obtained from investigation of twenty-seven chemical plants. New commercial techniques discovered in the plastification, lamination and application of thermoplastics and thermosetting resins, as well as the specialized chemical developments and production of synthetic materials are recorded. Plants included in investigation and chief projects described are as follows: Collodin Werke (artificial leather and dextrine leather process); Rheinhold and Cie. (Iporka Plastic, foamy insulating material); Chemische Werke Albert (Alphtalat); Deutsche Waffen and Munitions Fabrik (cartridge case materials).

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FIAT REPORT NO. 68

UNCLASSIFIED

INSTITUTE FOR MATERIALS RESEARCH, SONTHOFEN/ALLGAU.
Reported by: S. Tour. 30p.

This report deals with the work of a section of the original research institute known as the D.V.L. setup in Berlin. Its research was on the physical properties of materials, principally steels, light metal alloys and bearing alloys. General organization of institute and departments of work are detailed in Appendix I. Program of research under way in April 1945 is given in Appendix II. Appendix III contains a list of printed reports on research covering the period April 1942 to March 1944. Appendix IV lists reports not yet published. See also PB 507.

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FIAT REPORT NO. 77

UNCLASSIFIED

INTERROGATION OF RESEARCH WORKERS AT THE AGRICULTURAL HIGH SCHOOL (LANDWIRTSCHAFTLICHE HOCHSCHULE) AT HOHENHEIM (NEAR STUTTGART). Reported by: R. A. Dutcher. 6p.

The most important information discovered by investigator and presented in this report deals with chemical method developed by Dr. Lakon to use in seed germination testing. Advantages of this method are that it requires only a short time and can be conducted on fresh new seeds. This method is supposed to have been employed successfully with wheat, corn, oats, and rye. It depends on the reaction of the living embryo with a chemical reagent. A pink color results with living tissue and little or no color if embryo and adjacent tissue are not capable of growth. Color reagent is a tetrazolium salt which reduces to a colored (pink) formazene compound. Formulae are given and references to more detailed information are listed.

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FIAT REPORT NO. 82

UNCLASSIFIED

SUMMARY REPORT ON GERMAN RESEARCH AND TECHNOLOGY IN FOOD. Reported by: G. MacKinney. 13p.

This report is an account and evaluation of research in freezing, vegetable dehydration, vitamin C carrying foods, and miscellaneous developments in the food industries. Three developments in quick freezing are reported: A continuous "paternoster" type of quick freezer; drum-freezing of juices; quick-freezing in liquid nitrous oxide. Vitamin research was centered on the fat-soluble vitamins A and D, and on vitamin C. Very little attention was given to the overall quality of the processed food. Continuous butter making machinery is noted. The author concludes that only in the field of fats and oils (e.g., the production of fatty acids from paraffin straight chain hydrocarbons) did the Germans make outstanding contributions.

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FIAT REPORT NO. 90

UNCLASSIFIED

INTERROGATION OF PROF. FRANZ FISCHER. Reported by: W. A. Horne. 6p.

Professor Franz Fischer, former director of the Kaiser Wilhelm Institute, Mulheim, was interrogated. Inactive since March 1943, he gave information from memory on isosynthesis, iron synthesis, nickel catalysts, suspended catalysts, and isomerization. The production of hydrocarbons, predominantly isobutane and isopentane, from carbon monoxide and hydrogen is known as "isosynthesis". The middle pressure synthesis of hydrocarbons from carbon monoxide and hydrogen over an iron catalyst was initiated at the Institute. Nickel catalysts are unsuitable for middle pressure synthesis and there is no technical advantage in suspended catalysts. Best results in experiments on the isomerization of Fischer-Tropsch products were obtained with aluminum chloride.

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FIAT REPORT NO. 92

UNCLASSIFIED

GERMAN PROCESSING OF FATS, OILS AND OILSEEDS. Reported by: W. H. Goss and K. S. Markley. 125p.

A detailed report of inspection trips to 19 plants engaged in processing fats, oils and oilseeds in Germany, Denmark and Holland. Information is given on the various operations conducted at the plants in the production of fatty acids, margarine, vegetable and seed oils. Methods of pressing and extraction and of hydrogenation are also described.

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FIAT REPORT NO. 94

UNCLASSIFIED

AGRICULTURAL LIBRARY OF THE LANDWIRTSCHAFTLICHE HOCHSCHULE AT BONN. Reported by: G. MacKinney. 16p.

This report is an evaluation of this library which had an excellent collection of German periodicals in agricultural economics, good coverage in soils, plant physiology and forestry, and in certain special fields of agricultural technology, dairy and livestock feeding and management. It was poor in food and nutrition but contained an apparently complete record of Ph. D. dissertations in agriculture from all German universities and technical high schools. Several smaller libraries supplement this one. Lists of current periodicals and of all new books acquired during 1941 - 1945 are included in this report.

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FIAT REPORT NO. 104

UNCLASSIFIED

SURVEY OF THE ARC CARBON INDUSTRY OF GERMANY. Reported by: H. H. Wikle and W. A. Steiner. 13p.

In general, the German arc carbon industry uses the same materials as in the U. S.; German production methods are much less efficient than U. S. methods from the standpoint of labor; quality level is equivalent to American. The outstanding achievement was the development of large searchlights, first the 450 amp. size and the 1,000 amp. size at the end of the war. This required solution of the fundamental problem of arc instability observed at currents above about 400 amp. and of other difficult design problems. The authors believe that this searchlight was of limited military value compared with other methods of aircraft spotting such as radar. Report includes detailed descriptions of searchlight carbons, brief notes on individual plants visited and photographs of burner mechanisms.

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FIAT REPORT NO. 107

UNCLASSIFIED

COLD-RAY PASTEURIZATION OF MILK. Reported by: C. O.
Ball. 12p.

Cold ray pasteurization of milk represents an objective which the Prussian Test and Research Institute for the Dairy Industry at Kiel, hopes to attain with the use of an ultra violet ray machine, invented by Siemensschuckerwerke, Siemensstadt, near Spandan, Berlin. There are only two of these machines in existence. Both are installed in the plant of Hansa Meieri Facherberger Allee, Lübeck, which produces evaporated milk and milk powder. One is a machine of small capacity; the other of a larger size which is considered feasible for commercial operation. The small machine consists essentially of a quartz tube, said to be 110 meters long in spiral form and a source of ultra violet rays. The ultra-violet ray machine is to be a part of a new production system for modified milk in powdered form. This product is now being enriched with vitamin D by passing the liquid concentrate of approximately 30 percent total solids content through the small machine, thus imparting vitamin D immediately preceding the spray drying operation. This is accomplished by passing the liquid through the coil at a rate of 200 liters per hour. The large machine has been tested only for mechanical operation by pumping water through the milk tubes. The efficacy of the machine for either vitamin D fortification or pasteurization is unknown. An undated progress report of the Bacteriological Institute of the Preussische Versuchs- und Forschungsanstalt für Milchwirtschaft, Kiel, included in this report, presents results of studies with the ultra-violet ray machine. A bibliography and drawings are also given.

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FIAT REPORT NO. 114

UNCLASSIFIED

PREFABRICATED HOUSING IN GERMANY. Reported by: C. A. Towne.
42p.

Wartime prefabrication of housing in Germany took the form principally of emergency shelter for bombed out families. Rigid limitations were placed on size and arrangement. The principal types are: Wood panel; wood wool panel; gypsum panel; precast concrete; and foamed concrete. An appendix has plans and illustrations and a translation of the Gustav Eppel plaster board method of construction.

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FIAT REPORT NO. 115

UNCLASSIFIED

SURVEY OF THE CARBON BRUSH INDUSTRY FOR ELECTRICAL EQUIPMENT OF GERMANY. Reported by: H. H. Wikle and W. A. Steiner. 23p.

This report presents information obtained on the processes, equipment and products of the carbon brush industry based on field investigations. Generally, the German industry used the same type of raw materials used in the U. S. Bavarian natural graphite was substituted for Ceylon graphite and iron powder was used instead of copper powder for tamped connections for carbon brushes. German manufacturing processes are similar to the American; production methods are inferior; quality and industrial "know how" are comparable. Details of manufacturing processes and equipment including mixing, moulding, baking, graphitizing, and finishing are given. The production of high altitude-high voltage and high altitude-low voltage brushes, industrial and traction brushes, and metal-graphite brushes is described and the characteristics of the brushes listed. Brush holders made by German brush manufacturers are accurately finished. Some experimentation was undertaken with carbon commutators. Report includes drawing of carbon commutator and photographs of some representative brushes. Brief notes are given on plants visited and also on two plants which could not be visited.

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FIAT REPORT NO. 125

UNCLASSIFIED

SCHOKO-BUCK STUTTGART (CHOCOLATE MANUFACTURING FIRM).

Reported by: W. T. Clark. 11p.

This report presents detailed information on this chocolate manufacturing firm. Inventory on hand in August 1945 and suggestions for the use of materials available from inventory as well as recipe for product to be made are given. Scho-ka-kola was a caffein-containing ration manufactured for Wehrmacht. Wrapping machinery available at this plant, including two automatic Max Loesch units, was in excess of actual production needs. Two preservatives were in use. One of these, Microbin, was used in fruit and marmalade pastes to prevent souring, fermentation and spoilage; the other, Fettabacterin or Abacterin, is a fat antioxidant for use in marzipan and fatty cream fillings. Formulas of Kola products are given.

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FIAT REPORT NO. 127

UNCLASSIFIED

REPORT ON CONTINUOUS VISCOSE MAKING AT THURINGISCHE ZELLWOLLE A. G. Reported by: L. Smith. 4p.

This report made on behalf of the British Board of Trade and the U.S. Technical Industrial Intelligence Committee, discusses a visit to Thuringische Zellwolle A.G., and an interview with Dr. Friedrichs, Dr. Hessel and Dr. Schmidt. This plant makes viscose staple fiber using in part a continuous viscose process, as follows: Steeping is done in batches, pressing and ripening is continuous; Anthation and all subsequent steps are done in batches; churn-dissolvers are used. The process is discussed in detail.

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FIAT REPORT NO. 129

UNCLASSIFIED

CONTINUOUS VISCOSE MAKING AT I. G. FARBENINDUSTRIE A. G. WOLFEN, GERMANY. Reported by: D. B. Wicker. 6p.

This plant, having a capacity of 60 metric tons per day, was found to be substantially undamaged, but out of operation. Half the capacity is steeped in conventional presses and half by a continuous steeping process utilizing a moist pulp, steeping in the form of slush stock and pressing by means of screw presses. The aging of alkali cellulose is done continuously in rotary drums. Xanthation, solution and aging is batchwise. Continuous steeping and aging results in considerable reduction in manpower requirements.

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FIAT REPORT NO. 136

UNCLASSIFIED

MANUFACTURE OF CONTINUOUS FILAMENT YARN AND DURAFLOX STAPLE AT V. GLANZSTOFF FABRIK, OBERBRUCH, GERMANY. Reported by: L. H. Smith. 7p.

Processes used by V. Glanzstoff Fabrik in the manufacture of viscose process continuous filament and Duraflox high tenacity staple are described. A new machine for aging alkali cellulose in six hours was developed and is described. This system of aging has been installed in the new A.K. U. staple plant in Arnheim, Holland. The large bobbins used in this plant produce two packages of yarn, each package weighing 750 grams. It was stated that it is possible to spin one kilogram of yarn per package. The Hollander purification machine which is used is obsolete.

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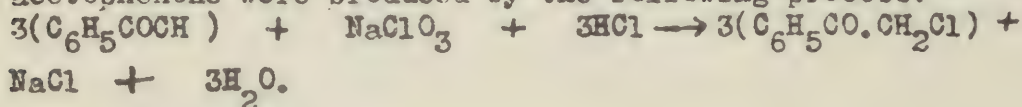
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FIAT REPORT NO. 144

UNCLASSIFIED

ACETIC ACID RECOVERY, ACETOBUTYRIC ACID RECOVERY, PROPIONIC ACID RECOVERY AT I. G. FARBEN, DORMAGEN. Reported by: G. Loasby and F. S. Brown. 7p.

The factory at Seelze was concerned mainly with the production of metallic fluorides, silico fluorides, hydrogen fluoride, phosphoric acid, phosphates, sulphuric acid, ether, colloidal graphite, water purifying agents and general reagents for laboratory analytical work. One building was set aside for smoke mixtures, another for the production of chloracetophenone. 120 tons/month of chloracetophenone were produced by the following process:



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FIAT REPORT NO. 145

UNCLASSIFIED

ACETIC ANHYDRIDE PRODUCTION FROM ACETIC ACID, I. G. FARBEN, DORMAGEN. Reported by: G. Loasby and F. S. Brown. 4p.

Acetic anhydride is produced by dissociation of acetic acid vapor at 600-720°, using triethyl phosphate and water as catalysts. Ammonia vapor is added as a stabilizer to the ketene. The ketene produced is absorbed by glacial acetic acid in scrubbers yielding 90% anhydride. 30% acetic acid is the other dissociation product. The anhydride is fractionated to 95-97% by large batch distillation. Flow sheet is presented.

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FIAT REPORT NO. 153

UNCLASSIFIED

PUNCHING OF SPINNERETS, I. G. FARBEN, AGFA CAMERA WERK, MUNICH. Reported by: L. H. Smith and J. J. Schilthuis. 5p.

Description with diagrams of punching of tantalum spinnerets, for the manufacture of staple fibre, having 2500 holes. Platinum and gold jets are plated with nickel before polishing. Steel spinnerets from V2a and V4a for perlon spinning were examined and a steel spinneret for nylon spinning was obtained.

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FIAT REPORT NO. 154

UNCLASSIFIED

THE GERMAN WOOLEN INDUSTRY. Reported by: A. E. Otto, F. W. Dorman and G. Y. Jean. 14p.

Reports information obtained by personal interviews and visits to mills on German woolen yarn manufacturing, weaving and finishing, stock and piece dyeing, carpet industry and use of waste material, including condition of the mills, machine equipment as compared to American (generally inferior), and processes used. The woolen yarn industry in Germany is, according to American standards, obsolete. There are only four carpet weavers of any importance in western Germany, and the industry has nothing of value to us.

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FIAT REPORT NO. 170

UNCLASSIFIED

ANIMALIZATION AND WATER PROOFING OF CELLULOSE FIBERS AT GORMAGEN. Reported by: D. Traill. 5p.

Animalization of Cuprammonium staple fiber has been carried out at Dormagen by the use of ethylene imine derivatives, but the work has not passed the experimental stages. Experimental work has also been prosecuted with the aim of rendering fibers water repellant, but again the work hardly emerged from the experimental stages.

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FIAT REPORT NO. 174

UNCLASSIFIED

INVESTIGATION OF THE NEW WEHRMACHT (1944) LAST AND SHOE CONSTRUCTION. Reported by: R. P. Schwartz. 7p.

This report gives the general background of the 1906 Wehrmacht boot, and the development of the 1944 Wehrmacht last and shoe. The latter was ordered by the German High Command primarily because of the serious difficulties experienced on the Russian front, and due to the shortage of leather. A bibliography is presented in an appendix. Tests showed that the buna rubber sole with 35% buna rubber wore twice as long as the standard sole leather.

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FIAT REPORT NO. 179

UNCLASSIFIED

SUCHARD SCHOKOLADEN FABRIK, LORRACH. Reported by: P. L. Pavcek. 7p.

This report describes factory which in peacetime produced chocolate, chocolate products, and cocoa but during wartime produced fruit bars for civilian and army consumption. Special vitamin C fruit bars were manufactured for the Wehrmacht. Details of their method of preparation are given. Appendix contains formulas for fruit bars and analysis of Sanddornbeere, a fruit containing vitamin C.

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FIAT REPORT NO. 181

UNCLASSIFIED

NUTRITION AND FOOD SUPPLY IN SAAR, SAARBRUCKEN. Reported by: P. L. Pavcek. 9p.

This report is based on interviews with a number of German officials (public health workers, doctors, etc.). Food allocation per person in the Saarbrücken and Sülzbach areas are given for the month of July 1945 and compared with August - September 1944 and September 1943.

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FIAT REPORT NO. 182

UNCLASSIFIED

UNION MARGARINIÈRE BELGE S A BAASRODE, BELGIUM. Reported by: K. S. Markley. 9p.

Description of facilities and methods at plant processing peanuts, palm kernels, sheanuts, and copra for oil. During the war no sesame or copra were processed. The plant also refines palm oil, palm kernel oil from the Belgian Congo, soybean oil (previously from Manchuria), whale oil and seal oil. The crude oilmill consists of one 125-ton standard Hansa Muhle extraction plant and three combination expeller-hydraulic mills. Crude oil is shipped to soap works at various places, or hydrogenated and shipped to margarine manufacturers. No difficulty was experienced with reversion in margarine containing soybean oil but it is used to the extent of only 5% and unhydrogenated. Most difficulty occurs with palm oil.

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FIAT REPORT NO. 195

UNCLASSIFIED

YEAST AND NUTRITION TARGETS IN GERMANY. Reported by: P. L. Pavcek. 7p.

This report is rather general in nature. The production of food and feed yeast, baker's yeast and yeast extract are briefly discussed. Caloric intake of civilian in the Saarbrücken area is mentioned. Methods of vitamin assay, data on food composition and production of biotics, ergosterol and gluconic acid are briefly mentioned.

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FIAT REPORT NO. 202

UNCLASSIFIED

THE MANUFACTURE OF PLYWOOD AND RELATED PRODUCTS IN WESTERN GERMANY. Reported by: F. F. Wangaard and J. H. Tigelaar. 90p.

This report covers an investigation of plywood and glue manufacturers and research institutions within the French, British and American occupation zones, to ascertain status of the plywood and gluing industry and affiliated research in Germany. The quality of the products of the plywood industry, aircraft plywood excepted, was generally inferior to those produced in the U.S., and production methods were less efficient. Subjects covered are: Veneer, aircraft, utility, furniture, molded, and metal-faced plywood, laminated veneer, modified wood, urea-formaldehyde, melamine-formaldehyde, phenol-formaldehyde, polyisocyanate and miscellaneous glues, and research. The part on research contains lists of references to publications prepared since 1940. Appendix gives details of individual targets, the condition, personnel, war and pre-war products, production capacity, etc. Appendix B contains representative aircraft plywood specifications in German.

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FIAT REPORT NO. 212

UNCLASSIFIED

QUICK FREEZING OF FOODS IN LIQUID NITROUS OXIDE, I. G.
FARBEN AT HOCHST. Reported by: G. MacKinney. 11p.

An experimental pilot plant setup capable of freezing 1 ton of food per hour is described in detail. The food is immersed directly into the liquid N_2O . The method is of interest for consideration by U. S. processors of frozen foods to determine whether its theoretical advantages are feasible and adaptable to their plants. Three blueprints frequently referred to in this report were not with the report as received.

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FIAT REPORT NO. 213

UNCLASSIFIED

SUMMARY OF FIELD INVESTIGATION - FATS, OILS AND OILSEEDS.
Reported by: W. H. Goss. 24p.

A survey resulting from visits to the principal oilseed industries in Germany in order to obtain an accurate overall summary of German oilseed technology during the past 5 to 10 years. Attention is paid to methods of processing and refining fats and oils, the production of lecithin, margarine, synthetic fats, soaps, soy flour, etc. Germany suffered severely during the war because of the shortage of fats, and though it was once a leader in the development of oilseed technology, it now lags far behind American methods.

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FIAT REPORT NO. 215

UNCLASSIFIED

FUMIGANTS DISTRIBUTED BY DEGESCH, A. G., WEISSFRAUEN-STRASSE 9, FRANKFORT. Reported by: P. L. Pavcek. 4p.

Five fumigants sold by this company are described in this report: "Zyklon B"; "Cartox"; "Tritox"; "Ventox"; "Calcid".

1. "Zyklon B" is manufactured from active agent HCN obtained from sugar beet residues. For each cubic meter to be fumigated, ten grams of "Zyklon B" are used. It is used in homes and factories.
2. "Cartox" is a mixture of one part ethylene oxide and nine parts carbon dioxide packed under pressure in steel cylinders. It is used for exterminating meal beetles.
3. "Tritox" is trichlor-acetonitrile, a liquid put up in 30 kilogram galvanized tin cans. It is used for house insects.
4. "Calcid" is calcium cyanide used for fumigating plants, especially citrus trees. It is also recommended for freeing holds of ships of rats.
5. "Ventox" is acrylic acid nitrile useful in combatting clothes lice and meal beetles.

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FIAT REPORT NO. 235

UNCLASSIFIED

HUMMEL & CO., WINNENDEN. Reported by: P. L. Pavcek. 5p.

Process for making cider, rhubarb and pear juice and rose hip syrup described in detail. Analysis of rose hip syrup indicates an ascorbic acid (vitamin C) content of 100-200 mg./100g. Residues of the fruits are used as follows:

- Apples - pectin manufacture
- Rose hips - dried and used for tea
- Rhubarb - dried and mixed with tobacco

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FIAT REPORT NO. 239

UNCLASSIFIED

FISCHER-TROPSCH PLANT AT HOESCH BENZIN, A. G., AT DORTMUND, GERMANY. Reported by: W. C. Schroeder and B. Neumann. 6p.

The plant is described and the operations briefly described. The plant produced gasoline with an octane no. of 40-45. Diesel oil with a cetane no. of 100, heavy oil and paraffin. Yields were 20-25%, 30%, 25% and 20-25% for the four products respectively.

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FIAT REPORT NO. 244

UNCLASSIFIED

GERMAN FOOD PROCESSING AND MANUFACTURING TARGETS. Reported by: W. T. Clarke. 43p.

A report on four German food processors visited by an American investigator. Kaffee Handels A. G. (Kaffee "Hag") in Bremen and Max Specht of Hamburg provided data for a discussion of coffee and coffee substitutes in war-time Germany. Gebruder Stollwerck A. G. of Cologne and B. Sprengel Company of Hannover, two chocolate and cocoa plants were also visited. Manufacturing processes are described. An appendix describes the production of "Scho-ka-Kola", a widely used German confection.

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FIAT REPORT NO. 257

UNCLASSIFIED

SUMMARY REPORT ON FOOD AND AGRICULTURE TARGETS. Reported by: R. L. Perry. 14p.

This report presents information obtained from visits to German plants on refrigerating equipment, refrigeration storage, frozen foods, dehydration, dairy products, and fish machinery. In frozen food industry problems were primarily those of management and plant and field control; technique was based on American developments. Exceptions may be the nitrous oxide fruit and vegetable freezing proposal and the controlled humidified hot air blanching, but these could not be investigated. In dehydrated products, Germany was satisfied with an unsulfited product of 10 to 14% moisture which simplified their dehydration techniques. Two continuous butter making processes and a mechanized cheese process were in operation in a number of plants. Plants visited are listed and all unusual equipment is described.

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FIAT REPORT NO. 260

UNCLASSIFIED

PLANT OF ANDREAS HOFER, LTD., MUELHEIM (RUHR) GERMANY. Reported by: W. H. Reynolds. 7p.

The Hofer plant specialized in the design and construction of laboratory scale super-pressure equipment for bringing about certain chemical reactions with the aid of high pressure, high temperature and various catalysts. Much of the chemical industry in Germany can be traced back to the experimental equipment originally furnished by Hofer. Brief description is given of various features of Hofer compressors and reference is made to voluminous reports and drawings which have been filed with the Executive Secretary, Safety and Technical Sub-Committee, Field Information Agency, Technical, Washington, D. C. These include drawings of a pump for recirculating of gas under high pressure and for a recirculating pump for liquids at high pressure.

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FIAT REPORT NO. 273

UNCLASSIFIED

INTERVIEW WITH DR. J. W. REPPE, I. G. FARBENINDUSTRIE, A. G. Reported by: E. B. Peck and I. H. Jones. 24p. Report on the chemical developments achieved by Dr. J. W. Reppe. His principal contributions to the war were: 1. Synthesis of a substitute for blood plasma called Periston. 2. Development of an adhesive that makes Buna adhere to fabric and is called Korosin. This was an essential part of the German synthetic rubber program. 3. Development of new reactions in the synthesis of butadiene. In addition, Dr. Reppe and his co-workers developed processes involving new reactions of the acetylenes, olefines and reactions of metallic carbonyls. The success achieved in acetylene chemistry was made possible by the development of safe methods for metallic acetylides. Details of all processes are given. Important patents issued on inventions of Dr. Reppe are listed.

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UNCLASSIFIED

REPORT ON VISIT TO THE FORESTRY INSTITUTE. Reported by: C. P. Winslow. 15p. This report covers a visit to the Forestry Institute, Schloss Reinbeck b. Hamburg. The activities, finances, personnel and chemical research of the Institute are described. Major activities include collection and compilation of data regarding forest resources of Germany's former colonies and of other countries, and during the war German forests production, consumption, etc. (data obtained from Reich Forestry Headquarters at Berlin). Some figures are given in this report for consumption, outtings and yields during the war period, military damage to forests is considered briefly, as well as the present condition of Germany's wood products industries. Recommendations, a list of important Germans in the forestry field and one of eminent German cellulose industrialists complete the report. Dr. Runkel mentioned experimentation on use of peat to produce sugars and protein food.

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FIAT REPORT NO. 276

UNCLASSIFIED

KAISER WILHELM INSTITUT FOR KOHLENFORSCHUNG, MUELHEIM, RUHR.
INTERROGATION OF DR. HELMUTH PICHLER AND PROF. KARL
ZIEGLER. Reported by: W. F. Faragher and W. A. Horne. 15p.

This institute was visited to obtain information concerning "Isosynthesis" and the results of the comparative tests on six iron Fischer-Tropsch catalysts conducted at Schwarzheide-Ruhland. The information presented herein is in addition and supplements that previously reported in the C.I.C.S. report dated 15 June 1945, "Kaiser Wilhelm Institut für Kohlenforschung, Mülheim, Ruhr", by Dr. V. Haensel. In the so-called "isosynthesis", carbon monoxide and hydrogen are converted predominately to branched hydrocarbons by oxide catalysts. Similarly to the normal or medium-pressure synthesis, isosynthesis results in the production of hydrocarbons from methane to those of high molecular weight. In isosynthesis, however, the principal products are isobutane and the low-boiling hydrocarbons of gasoline.

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FIAT REPORT NO. 277

UNCLASSIFIED

INVESTIGATION OF VARIOUS FOOD PROCESSING TARGETS. Reported by: A. K. Balls. 15p.

This report describes method of growing the yeast, and preparation of a yeast extract and a dry yeast preparation known as Florylin, at the Norddeutsche Hefeindustrie A.G., Hamburg-Wandsbek. Beet molasses is used as the carbohydrate source. It reports the preparation of Milei, a by-product using skim milk, made by Milchenzentrale G.m.b.H., Lütjenburg i Holstein, which is essentially a milk plant. "V Milei" a substitute for whole egg was made by dissolving certain chemicals, in 300 l. of skim milk with stirring, then mixing the solution with 1300 l. more of skim milk, and drying at once on a rotary drum drier. Milei "Eiweiss" or egg white substitute was also made. It further reports an interview with Prof. Ludwig Schmitt, at Technische Hochschule, Darmstadt on sugar-beet as a means of improving the soil and of producing fodder by use of beet tops, and two processes for synthesis of protein by a micro organism, one on sliced sugar-beets, and the other the Niklas process.

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FIAT REPORT NO. 278

UNCLASSIFIED

SPECIALIZED CERAMIC PRODUCTS: THEIR USE IN GERMAN COMMUNICATION EQUIPMENT. Reported by: C. L. Snyder. 40p.

This report covers information obtained by interview of personnel and inspection of some of the leading specialized ceramic plants in Germany. Differences between German and American practice have been emphasized, the most striking being that German practice is to grind materials more finely. This increases the cost of grinding, but results in less die wear, and use of organic binders in prefired state is not common due to plasticity of finely divided material. Subjects covered are: Glass to metal seal; Vacuum tight crank mechanism; Selenium cell rectifier; High dielectric constant and magnetic ceramic materials; Robert Bosch Co.; Spark plug core production methods; Steatit Magnesia Co.; Dralowid resistor, Steatite and titanium dioxide manufacture; Rosenthal porcelain; Fixed carbon resistors; Thermistor manufacture.

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FIAT REPORT NO. 293

UNCLASSIFIED

I. G. FARBENINDUSTRIE LEVERKUSEN, GERMANY. Reported by: W. F. Faragher. 13p.

This report describes plant, machinery, processes, and products at the following four factories manufacturing rope and twine; International Harvester Co.; P. Baumhüter; Steen and Co.; Bremer Tauwerk-Fabrik. Process of making paper binder twine was the significant new development observed. Paper was substituted for sisal. Rolls of paper (Swedish natrium spinning paper) were treated with a paraffin emulsion for water resistance. For one-yarn, twine paper was twisted; for 2 ply, it was twisted and corded. Twine was then dried and polished over block paraffin, then packed. Hemp was substituted for manila in rope. Some experimental synthetic binder twine had been made.

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FIAT REPORT NO. 297

UNCLASSIFIED

FATS, OILS AND OILSEEDS. Reported by: W. H. Goss. 23p.

A survey of two German oilseed mills - Hansa-Muhle A.G., Hamburg, and Harburger Oelwerke Brinckmann und Mergell, Harburg. The first is one of the most famous mills in the world, partly because of its size and partly because it developed the widely used paternoster type of extraction apparatus. Report has detailed descriptions of procedures used in both plants for oil extraction from soybeans and other oilseeds; also of phosphatide recovery, refinery of the oil, hydrolysis of fats for production of fatty acids, and other related processes.

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FIAT REPORT NO. 299

UNCLASSIFIED

SUPPLEMENTAL REPORT ON THE RUHROL HYDROGENATION PLANT WELHEIM, RUHR. Reported by: W. F. Faragher and W. A. Horne. 7p.

This report gives some details regarding the preparation of catalyst used in coal hydrogenation at this plant at 700 atm. For further details on this plant see P.B. 1108.

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FIAT REPORT NO. 329

UNCLASSIFIED

TEXTILE RESEARCH AND EDUCATION AT TEXTILINGENIEURSCHULE
KREHFELD. Reported by: J. F. Smith. 3p.

The Textilingenieurschule was composed of the Färbereischule, the Webereischule, a school for artificial fiber, a school of textile art, a department of paint and varnish technology, and a department of management. One of the chief contributions of the Textilingenieurschule was conversion of acetate rayon to woollike fibers.

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FIAT REPORT NO. 330

UNCLASSIFIED

CIRCULAR KNITTING AND ITS DEVELOPMENT IN GERMANY SINCE
1930: Reported by: P. H. Hanes, Jr., and C. L. Rosenquist
4p.

This is a list of 56 samples of knitted materials made by the circular interlock knitting machines of Fouquet & Franz, of Rottenburg a.N., Germany, which are now available for inspection at the U. S. National Bureau of Standards. These were obtained during an inspection of this plant which is reported in PB 6347, page 459 of this Bibliography. Among the samples are interlock backing cloth, face plain, back plated with little lining loops (napped); vertical pearl striping; two and three color check effects; and block and stripe effects.

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FIAT REPORT NO. 333

UNCLASSIFIED

WOOLEN CARDS AT THOMAS SCHEUFFELEN A. G., EBERSBACH (FELS)
WURTTENBERG. Reported by: J. L. Truslow. 7p.

A study of a set of woolen cards built by C.E. Schwalbe of Verdau in Saxony in 1937 which are of special design. Main feature of the machine is that the Intermediate Card has a special front which forms a lap, similar to that made on a Cotton Picker. The Finisher Card has a back which provides for creeling two laps. These features allow evener roving and yarn, and the Finisher Card can be operated while the Breaker and Intermediate Cards are being stripped on ground, and vice versa. Report contains description of machinery.

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FIAT REPORT NO. 334

UNCLASSIFIED

MANUFACTURE OF GLAZED KID AND KID LINING LEATHER IN GERMANY. Reported by: G. A. Rothschild and P. A. Blatz. 9p.

Production of calf as well as kid is very much favored in Germany by the low wage scale. Machine and hand operations are slowly and carefully done, this factor being the principal reason for the quality of German leather. In general, there have been no outstanding new developments as to processing. "Arazeme" process seems to be more in favor in Germany than in the United States. Tanning is consistently two bath chrome for kid and one bath chrome for calf. A general description of tanning procedures is given.

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FIAT REPORT NO. 336

UNCLASSIFIED

THE GERMAN CORKBOARD AND STRUCTURAL LOW TEMPERATURE INSULATION INDUSTRY - TECHNICAL DEVELOPMENTS. Reported by: E. C. Claxton. 8p.

Major technical development of interest in the field was the production of considerable quantities of urea formaldehyde resin foams. Research work on other foams was carried out on a small scale. Both impregnated and baked corkboard manufacture were continued, although on a reduced scale. Non-structural or loose-fill insulations were used to only a limited extent. Photographs and exhibits referred to in the text were forwarded to Military Planning Division, Office of the Quartermaster General, Washington, D.C.

Item No. 22

FIAT REPORT NO. 337

UNCLASSIFIED

GERMAN TEXTILE ROLL-COVERING MATERIALS. Reported by: E. Claxton. 9p.

A report on German production of roll surfacing materials, both cots and aprons, based on visits to three German factories. The German textile industry cot and apron developments of interest are in polyvinyl chloride and polyvinyl alcohol plastic compositions and in their methods of manufacture. The composition developments have paralleled those carried on in the United States. Leather is still used to a considerable extent despite shortages. No evidence of extensive development of synthetic rubber cots and aprons or of resin bonded cork cots. Contains photographs of a double screw extrusion machine and other machinery used by the industry for tensing and stretching and for making tubular shapes.

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FIAT REPORT NO. 349

UNCLASSIFIED

THE GERMAN CORK COMPOSITION INDUSTRY. Reported by: E. Claxton. 11p.

German cork composition industry follows methods similar to those in the United States. An exception is a composition cork floor tile, which is not produced in America. Few new developments in composition appeared in the immediate prewar years, or during the war. The Vereinigte Kork Industrie A.G. controls the greater part of the cork composition industry and is, in turn, controlled by Swedish capital.

Item No. 22

FIAT REPORT NO. 350

UNCLASSIFIED

THE GERMAN LINOLEUM AND HARD SURFACE FLOOR-COVERING INDUSTRY. Reported by: E. Claxton. 29p.

Under the German war economy, the manufacture of floor-coverings was considered non-essential. The information on the technical status of the industry is consequently of a prewar character, with the exception of that on certain substitute raw materials, on improved calendering equipment, and on new polyvinyl chloride plastic flooring made in very limited amounts, and finally on related plastic products to which one of the linoleum manufacturers turned.

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FIAT REPORT NO. 351 (354 - 360)

UNCLASSIFIED

GERMAN PHOTSENSITIVE PRODUCTS MANUFACTURE. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 352

UNCLASSIFIED

ZELLWOLLE-LEHRSPINNEREI, DENKENDORF, GERMANY. Reported by: K. Ward, Jr. 10p.

This plant was designed as a research institute for the entire staple fiber industry. Facilities for spinning staple fiber on both the cotton and wool systems are present. There are 5,000 cotton and 2,000 wool spindles. A well equipped testing laboratory at 21° C and 65% r.h. is provided. A list of supporting firms is given. This institute possessed a collection of very good photomicrographs of all German staple fibers as well as of many natural and foreign fibers. "The range of fibers covered is so large as to make the collection very valuable." An appendix mentioned in the report listing the fibers and their properties was not received. Two sets of reports on recent research, one on the wool system, the other on the cotton system, are tabulated. "These reports have been translated and the translations are on file with the Quartermaster Corps." Information on staple fibers obtained in an interview with Mr. Bisinger, the technical director, is presented.

Item No. 22

FIAT REPORT NO. 362

UNCLASSIFIED

SYNTHETIC FATTY ACIDS, I. G. FARBENINDUSTRIE, A. G., LUDWIGSHAFEN. Reported by: K. S. Markley. 6p.

Production of synthetic fatty acids from Fischer Gatsch paraffins is briefly described. Production amounted to 20,000 tons per year. The nutritional value of these synthetic fatty acids is discussed briefly.

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FIAT REPORT NO. 364

UNCLASSIFIED

GERMAN FATS, OILS AND OILSEED PROCESSING PLANTS. Reported by: K. S. Markley and W. H. Goss. 20p.

Oil processing and margarine production at the following four plants are described and discussed: 1. Estol Akt. Gesel., Mannheim Industriehafen. 2. Hamburger Margarine Werke von Heinrich Voss, Hamburg. 3. Verein Deutscher Oelfabriken A.G., Mannheim. 4. J. H. Mohr & Co., Hamburg/

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FIAT REPORT NO. 365

UNCLASSIFIED

INDUSTRIAL PROTEINS, KARL FREUDENBERG. A. G. Reported by: K. S. Markley. 8p.

This report describes in detail a process for producing an artificial bristle similar to horse hair, using hide waste and damaged hides. Machinery used is described. The bristles are widely used for shoe, clothes, dust and industrial floor brushes. The bristles are not suitable for paint brushes. Product is known as "Marena". It is about 1/3 as expensive as nylon. A sausage casing, "Nauturin" is also made from the same starting material.

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FIAT REPORT NO. 366

UNCLASSIFIED

PRODUCTION AND FABRICATION OF GLUED WOOD PRODUCTS IN WESTERN GERMANY. Reported by: R. M. Seborg and H. O. Fleisher. 62p. Report discusses aircraft plywood, its production and properties; glues, including an interview with Dr. Edgar Moerath on glues, glueing research at the Focke-Wulf laboratory; and metal to wood glueing; fabrication of aircraft parts; wood propellers, high frequency heating, low density core materials, scarfing of plywood, metal to wood connections, and glueing of ties and timbers. Contains a list of references to other publications on this subject.

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FIAT REPORT NO. 368

UNCLASSIFIED

INTERROGATION OF DR. GUNTER SPENGLER, MUNICH, FORMERLY OF INSTITUTE FOR COAL RESEARCH GERMAN TECHNICAL HIGH SCHOOL, PRAGUE. Reported by: W. H. Thomas and J. G. Allen. 27p.

Subject matter treated in this report; General work at the Institute of Prague, hydrocarbon synthesis, mercuric addition compounds, organic addition compounds, research methods, adsorption, chlorination, reactions of olefins with NOCl , alpha-omega dicarboxylic acids, peat processing, and associated personnel. Tables, a nomograph and charts on peat utilization and drying are included. Accurate boiling points and some other physical constants are tabulated for about 20 olefins.

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FIAT REPORT NO. 369

UNCLASSIFIED

BUILDING MATERIALS - GERMANY. Reported by: F. I. Rowe.
17p.

The primary objectives of the investigation of German building materials reported here were to find new developments in construction materials and construction equipment, new uses of previously known materials and equipment, and information about possible new substitutes for previously used materials. Inspection of a number of factories, plants, etc. were made and interesting details are noted. Mass concrete is used on grade crossings, bomb shelters, and for factories, though with the shortage of cement during the war, plants were moved to quarries and saltmines where little cement was required. On railroads, highways, river and harbor structures, the concrete was faced with brick, stone, or a bush hammered or washed surface. There were no rubbed surface finishes. Concrete products, all precast and prestressed, have reached a high use in the following fields: High and low pressure pipe, poles for power transmission lines, trusses, hollow slabs, railroad ties, tunnel liner rings, window frames, lintels. A special process for making cement for concrete pilings exposed to sea water is given. Wood is a minor building material, being used normally in peace times only for window sash, doors, trim and finish. Saw dust is used as a filler in concrete for floors, building brick and slabs, and wood shavings mixed with cement are extensively used in making insulating blocks and slabs. There was a generous use of steel in prewar and war construction. Welding was used very little in contrast to practice in the United States. No unusual uses except as piling were noted in the building field. Due to prestressing, only high carbon steels were used. Appended are a list of persons interviewed, extracts from a translation of an article by Otto Graf on vibrated concrete, and a bibliography. Photographs of structures are included.

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FIAT REPORT NO. 371

UNCLASSIFIED

PRODUCTION OF FAT BY OIDIUM LACTIS. Reported by: Arnold
K. Balls. 9p.

Process of growing the above named organism and treatment to produce fat in yields of 20% of dry organism weight is described in some detail. Raw materials are grain hulls, straw, sawdust, etc. Material is hydrolyzed, and organism grown on resultant sugar solution containing certain additives. 97% of sugars in solution are utilized. Residue is used as cattle feed.

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FIAT REPORT NO. 370

UNCLASSIFIED

THE GERMAN ABRASIVE INDUSTRY. Reported by: S. S. Kistler.
63p.

This report covers information obtained from visits to the most important abrasive and grinding wheel factories in Germany. The abrasive industry was characterized by the wide distribution among many small companies, its lack of research and testing facilities and the absence of any superior developments of much interest to the American industry.

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FIAT REPORT NO. 389

UNCLASSIFIED

VENEER AND PLYWOOD MANUFACTURING TECHNIQUES AND MACHINERY OBSERVED IN WESTERN GERMANY. Reported by: R. M. Seborg and H. O. Fleischer. 44p.

This report consists of: (1) Survey of machinery and equipment and techniques in veneer and plywood manufacture; (2) descriptions of individual plants making plywood and manufacturing machinery. The investigators concluded that in general relatively little technical progress was made during the war; plant equipment was generally of pre-war design; products generally inferior to American. Several practices worthy of note are: 1. Veneer is handled on spools in a continuous manner from the lathe to the clipper; 2. air circulation system of Siempelkamp veneer drier; 3. small, simple, knife scarfing apparatus used directly on lathe is useful wherever veneers are required wider than can be produced on available lathes; 4. foam process of spreading urea resin glue. A list of references is given. Drawings of scarfing knife and of apparatus for cutting scarfs on logs are included.

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FIAT REPORT NO. 391

UNCLASSIFIED

STUDY OF NEW ADHESIVES PRODUCED BY I. G. FARBENINDUSTRIE A. G., LEVERKUSEN. Reported by: K. Ward, Jr. 15p.

Survey of the development of Desmodur R used for the adhesion of fabrics to rubber. Desmodur R is the triisocyanate derived from tri- (p-amino-phenyl) methane, used chiefly as a 20% solution in methylene chloride. Adhesion may be applied in three ways: 1. By adding Desmodur R to a rubber solution which is then used as an adhesive. 2. By impregnating fabric with it before calendering. 3. By adding 2-3% of it to rubber. Detailed instructions for the use of Desmodur R are given in an Appendix. Two tests for adhesion used by I.G. Farben are described; A static test, similar to "H" test used by American tire companies, and dynamic test under development. A new, more highly concentrated Desmodur R solution (50% solution in ethyl acetate) has been prepared and used. Stability of various Desmodur R rubber solutions is discussed and suitable mixtures are listed for rubberizing other rayon fabrics.

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FIAT REPORT NO. 394

UNCLASSIFIED

MODIFIED AND IMPROVED WOOD IN WESTERN GERMANY. Reported by: R. M. Seborg and H. O. Fleischer. 50p.

This report consists of (1) a general discussion of the methods of improving wood by densification and pressure, and also by other mechanical and chemical treatments; (2) brief notes on individual plants visited and persons interviewed. Modified and improved wood has been largely limited to wood that has been densified by application of heat and pressure. Practically no research has been conducted along the line of improving properties of wood by impregnation with synthetic resins. Densified wood, known as "Pressholz" was made from both laminated and solid wood. Beech is chief species used. Although the bulk of laminated improved wood is made into forming molds, this product is also made into propeller blanks, gears, and other articles. Usual manufacturing method is to densify the wood with heat and pressure and to use resins only as a bonding medium when panels are laminated. Improved wood products made chiefly from solid wood were widely used for shuttles and picker sticks in textile factories.

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FIAT REPORT NO. 407

UNCLASSIFIED

FATS, OILS AND OILSEEDS. Reported by: K. S. Markley and W. H. Goss. 44p.

Report on the subject industry as revealed through investigations of the following targets: (1) Delmenhorst Margarine Werke, Delmenhorst; (2) Henkel and Cie, G.m.b.H.; (3) Deutsche Fettsaure-Werke G.m.b.H. and the Markischen Seifen Industrie; (4) Oxo G.m.b.H.; (5) Fett-Raffinerie Zweigniederlassung der "Margarine Union" Vereinigte Oel- u Fett- Werke A.G., Brake i. Oldenberg; (6) Reichstelle für Fette und Eier Versuchsbetrieb Schleswig-Holstein, Elmshorn; and (7) Sunlicht Gesellschaft A. G.

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FIAT REPORT NO. 409

UNCLASSIFIED

SURVEY OF THE GERMAN LOGGING, LUMBER AND WOOD PRODUCTS MACHINERY AND EQUIPMENT INDUSTRY. Reported by: R. B. Peterson. 63p.

In general the development of German woodworking machines is behind U. S. machines. A few machines have been developed which are not built or commonly used in the U.S.: 1. The "glueless" method of making core stock; 2. the knot hole and veneer patching machines; 3. the continuous plywood production method-which is apparently just under development; 4. plywood cylinder making equipment; 5. gang frame saws designed for small mill use, and other allied saw mill machinery; 6. special machinery for lead pencils, wood heels, parquetry, wood rulers and similar products. These methods and equipment are presented in detail in the appendix, with drawings and photographs.

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FIAT REPORT NO. 414

UNCLASSIFIED

INDUSTRY OF GERMANY AND THE OCCUPIED COUNTRIES. FATS, OILS AND OILSEEDS. Reported by: K. S. Markley. 19p.

This report summarizes the results of a survey of the fat and oil industry of Germany and the occupied countries of Belgium, The Netherlands and Denmark which have in turn been reported in other reports. Plants investigated are listed in tabular form. Subjects include raw materials of the fat and oil industry of central and western Europe, economics, oilseed processing, refining and hydrogenation, margarine, reversion of soybean oil, use of ethyl esters and other extenders in margarine, synthetic fatty acids and fats, industrial proteins, soaps and detergents, and research and control laboratories.

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FIAT REPORT NO. 415

UNCLASSIFIED

FOOD PROCESSING AT KONDIMA-WERKE, ENGELHARDT & HEIDEN, STOLLERSTRASSE 19, KARLSRUHE I, BADEN. Reported by: L. B. Howard. 6p.

Report of investigation conducted September 6, 1945. Quite a variety of materials have been produced at Karlsruhe including intermediate products for the ice cream and confectionery trades, fruit juices and other non-alcoholic beverages. The Kondima-Werke, however, suffered considerable damage from military action with the result that possibly one-half of the plant was wholly inoperable, the portion of the plant where fruit juice and fruit pulp operations were conducted remaining usable. Processes in the production of nut pastes or jams from almond kernels and in the preservation of fruit juices without preservatives are described.

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FIAT REPORT NO. 416

UNCLASSIFIED

POMOSIN-WERKE, KOMM - GEO FISCHER & CO. Reported by:
L. B. Howard, 10p.

This report contains a description and discussion of the pomace drying plant concerned with the drying of apple pomace for storage, the pectin plant at Raunheim, and the Pektin-Fabrik Niederrhein (Süchtein). Extraction procedures at the two latter plants are explained in detail, and a drawing of the apple pomace drier is included.

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FIAT REPORT NO. 420

UNCLASSIFIED

REPORT ON "CHEMICAL BLANCHINE", A SUMMARY REPORT ON SEVEN TARGETS OF OPPORTUNITY. Reported by: Z. I. Kertesz. 4p.

The Germans occasionally obtained good results by blanching with ether vapor in the preparation of plant tissues for dehydration and freezing. More knowledge on the reactions involved is needed before a decision on commercial applicability can be reached.

Item No. 22

FIAT REPORT NO. 422

UNCLASSIFIED

MANUFACTURE AND REGENERATION OF CATALYSTS AT I. G. FARBEN-INDUSTRIE, LUDWIGSHAFEN, OPPAU. Reported by: W. F. Faragher and W. A. Horne. 14p.

The principal equipment in the plants inspected is presented in the form of flow sheets for the manufacture of four of the principal catalysts. Five additional catalysts are also described. Brown-oxide, methane-splitting, activated alumina, tungstic acid catalysts and a catalyst for the hydrogenation of acids, esters, aldehydes and ketones to the corresponding alcohols are included.

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FIAT REPORT NO. 426

UNCLASSIFIED

INTERROGATION OF DR. PIER AND STAFF, I. G. FARBENINDUSTRIE, A. G. LUDWIGSHAFEN, OPPAU. Reported by: W. A. Horne and W. F. Faragher. 40p.

The information contained in this report supplements that previously reported in the CIOS report of 16 August, 1945: "Report on Investigations by Fuels and Lubricants Teams at the I. G. Farbenindustrie A. G. Works at Ludwigshafen and Oppau". The following aspects of products and processes related to the petroleum industry are covered: Synthesis of hydrocarbons from water gas; toluene production; oxidation, polymerization and condensation and chlorination processes. Miscellaneous processes and products treated, include hydrogenation of butadiene to butylene; kybol; tannol; vanol HS; diolefins from olefins and formaldehyde; preparations of alkyl alcohol; and methacryl nitrile. A summary of spectrographic studies and equipment is included. Diagrams and tables.

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FIAT REPORT NO. 429

UNCLASSIFIED

DEVELOPMENT WORK FOR MANUFACTURE OF CAUSTIC SODA AND
SULFURIC ACID FROM SODIUM SULFATE. Reported by: Z. G.
Deutsch and J. Neubauer.

The cell described by Dr. Buergin and Dr. Messner of I. G. Farbenindustrie's Bitterfeld plants was operated at about 1000 amperes per square meter, maximum. The inlet solution was Na_2SO_4 saturated at about 30°C , (with a tolerable Cl^- content of 50 to 60 mg. per liter) and enough was circulated so that the catholyte outlet contained about $\frac{1}{2}$ of the salt in the feed. The horizontal cell had a mercury trough about 28 feet long with a steel bottom and rubber covered sides. The anode compartment was a trough with a tight steel cover and a bottom made of cross bars. This was all rubber and the porous rubber diaphragm was stretched over these bars. The slope in the long direction of the cell, the long decomposition cell and the Hg. pump arrangement were all identical with the prevalent I.G. Hg. chlor-caustic cell. The anodes were 7% silver-lead alloy plates. The diaphragm was made by roll-veneer cutting of a cast sponge-rubber cylinder. The high power consumption required by the horizontal cells led to the evolution of a cylindrical cell. The outer steel tank formed the cathode with the mercury fed down the inner walls from a circular weir. The anode was a cylindrical plate, again perforated and with a woven screen of polyvinyl chloride separating it from the micropore rubber diaphragm wrapped around its outside. This gave a minimal and uniform electrode distance. After operation for two months, this process was discarded in favor of the following. Viscose spin-bath was fed through two scrubbing towers where it absorbed recycling HCl - H_2O vapors, and then was fed with nearly anhydrous HCl . The precipitated salt separated in a continuous cycle centrifuge and purged of acid, was used in a regular I.G. Hg. cell electrolysis to generate the H_2 - Cl_2 for HCl and 50% caustic solution. The centrifuge filtrate, a 42% H_2SO_4 solution saturated with HCl , went in series through two evaporators. In the first, HCl was driven off. In the second, water was driven off with the residual HCl , giving an outlet liquor about 65% H_2SO_4 with 2 to 3% Na_2SO_4 and only traces of HCl . The vapors from the second evaporator were scrubbed by the freshly purged spin-bath and thus H_2O was continually purged from the system.

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FIAT REPORT NO. 430

UNCLASSIFIED

A SURVEY OF THE SODA ASH AND CAUSTIC SODA PLANTS OF WESTERN AND SOUTHERN GERMANY. Reported by: Z. G. Deutsch and J. Neubauer. 27p.

Six German plants were visited. These were: (1) Kali-Chemie plant at Heilbronn which produces soda ash; (2) Deutsche Solvag-Werke at Wyklen which produces soda ash; (3) I. G. Farbenindustrie plant, Oppau, which produces soda ash and NH_4Cl ; (4) Deutsche Solvay-Werke at Rheinberg which produces NaOH ; (5) Chemische Fabrik Koeln-Kalkat, Cologne, which produces caustic soda; (6) Matthes & Weber plant at Duisburg which produces caustic soda and soda ash. A description of each plant's processes is given as well as analysis of their products.

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FIAT REPORT NO. 431

UNCLASSIFIED

A SURVEY OF THE CHLORINE AND CAUSTIC PLANTS IN WESTERN AND SOUTHERN GERMANY. Reported by: J. Neubauer and Z. G. Deutsch. 53p.

The plant, equipment and processes of the following manufacturers of chlorine and caustic soda are described at some length: Anorgana G.m.b.H., at Gendorf; Dr. Alexander Wacker Gesellschaft für Elektrische Chemie G.m.b.H., at Burghausen; I.G. Farben plants at Höchst, Rheinfelden, Ludwigshafen, Leverkusen, and Huelo; the Degussa works at Knapsack; and Feldmühle Papier and Zellstoffwerke, at Lüttsdorf. Although 4 drawings are presented in this report, there are additional drawings on file with the Chemicals Subcommittee, JIOA Headquarters, Washington, D.C.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 437

UNCLASSIFIED

STICKSTOFF-SYNDIKAT GMBH, RAMHOLZ UBER VOLLMERZ, NEAR SCHLUCHTERN. Reported by: K. D. Jacob. 7p.
Subject Syndikat was organized in 1919 to act as selling agent and distributor for nitrogenous products, both for fertilizer and for technical purposes, manufactured by all German companies. Dr. Oster, General Director, supplied considerable information on the consumption of fertilizers, especially nitrogen, in Germany during the prewar years and some of the war years. This information is summarized in this report under the following topics: (1) Capacities and locations of German nitrogen plants (with table); (2) consumption of commercial fertilizers in Germany (3) distribution of nitrogen consumption in Germany; (4) principal types of nitrogen fertilizers manufactured in Germany.

Item No. 22

FIAT REPORT NO. 438

UNCLASSIFIED

FIBER PHOTOMICROGRAPHS AT I. G. FARBENINDUSTRIE, HOCHST, GERMANY. Reported by: K. Ward, Jr. 2p.
The technique used at Höchst of preparing the photographs is described, special lacquers, called generally "Rox", being used. Separate types of "Rox" were prepared for wool and for cellulose fibres, each having a refractive index equal to that of the material to be photographed. The longitudinal sections produced were excellent, only little work was done with cross sections. Two reprints of articles by Dr. H. Reumuth are listed which describe some of this work.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 439

UNCLASSIFIED

SCIENTIFIC RESEARCH ON CELLULOSE AND FIBERS. Reported by:
K. Ward, Jr. 12p.

Report of visits to following persons: In Germany, Messrs. Elöds, Freudenberg, Jayme, Staudinger, and Weltzien; in Austria, Messrs. Ecker, Kleinert and Kratky; in Italy, Messrs. Centola and Risso. The object of the interview of these men was to determine what had been done in the research laboratories in the war years. The report concludes that the research carried on by major investigators have, in general, followed the lines these men had already established for themselves; however, much of it has not been published and publication in full detail would be distinctly to the advantage of American science and industry. Bibliography: p. 6-11. Complete list of the 570 publications from Prof. Staudinger's laboratory was obtained, but is not included here.

Item No. 22

FIAT REPORT NO. 444

UNCLASSIFIED

WOOD CARBONIZATION INDUSTRY OF GERMANY. Reported by: E.
G. Locke and J. F. Saeman. 75p.

A part of this investigation was devoted to the Reichert process as employed by the Deutsche Gold and Silber Scheideanstalt vorm. Roessler (Degussa). This process features the use of recycled wood gas for heating the 100 cubic meter retorts. The activated charcoal plant of I.G. Farben at Leverkusen was also investigated. Three products are prepared from the wood tars: "Melakol" used as a plasticizer for reclaimed rubber, flotation oils, and four types of inhibitors. Two types of charcoal briquettes are manufactured from the fines and other sizes of charcoal for which there is no market.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 446

UNCLASSIFIED

PLASTIC AND WOOD FOR AIRCRAFT TOOLING AND FABRICATION.

Reported by: L. M. Harts and J. T. Grey. 38p.

This report describes the glues, resins, and plastic products for aircraft tooling and fabrication which are made by Chemische Werke Albert (Wiesbaden), Dynamit A. G. (Troisdorf), I. G. Farben (Leverkusen and Krefeld Verduigen), Otto Bosse A. G. (Stadthagen) and Volkswagen Werke (Fallersleben). A visit to the Focke-Wulf Static Test Laboratory also yielded some interesting items. The report gives production methods for making and using A. S. Glue, 319J, CS 593, Moltopren, Tronal, Polystal, Kaurit, Pressholz, and Obholz and describes the plastic fuselage section for the FW 190 plane. The appendix includes a list of the personnel interviewed, photographs, diagrams and bibliography. For a more extensive report covering the same material, see Report 71A of the TIIC Aeronautics Subcommittee, PB 36960 by the same authors.

Item No. 22

FIAT REPORT NO. 448

UNCLASSIFIED

PRODUCTION OF VANILLIN FROM SULFITE WASTE LIQUOR. Reported by: J. F. Saeman and E. G. Locke. 17p.

No vanillin has yet been produced in Germany on a commercial scale from sulfite waste liquor. Plans were in progress by which Boehringer and Sons, I.G. Farben and Hoffman LaRoche would form a company, "Ligrowa", to produce vanillin by the strong alkali cleavage of sodium lignosulfonate. Continuous operation in a copper reactor is claimed to be one of the key points in their method. The copper is claimed to have a catalytic effect very beneficial to the reaction resulting in the production of 20 percent more vanillin and the consumption of less alkali. Details of the proposed operation and production cost estimates are given.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 449

UNCLASSIFIED

CARBON MONOXIDE REACTIONS. Reported by: N. W. Krase. 5p.
This is a report of information obtained during an interview with Dr. Hugo Kroper on laboratory activities at Ludwigshafen. Dr. Kroper was in charge of carbon monoxide studies under Dr. J. W. Reppe. These experiments were concerned with the use of nickel carbonyl, Ni(CO)_4 , or iron carbonyl, Fe(CO)_5 , and with the use of H_2O instead of H_2 as a source of hydrogen.

Item No. 22

FIAT REPORT NO. 450

UNCLASSIFIED

WOOD AND CELLULOSE RESEARCH IN GERMANY. Reported by: J. F. Saeman and E. G. Locke, 50p.

Some of the leading German wood and cellulose research workers were interviewed as part of an investigation of wartime developments in the field of forest products. It was learned from Dr. H. Scholler, Soelln Laboratory of the "Technisches Buro Periola, G.m.b.H.", that important advances had been made in the fermentation of wood sugars to alcohol and to yeasts. Details were obtained from the Fredrich Bergiu Research Laboratory for an interesting process for the continuous concentrated acid hydrolysis of wood. This had gone through only the first stages of development in the laboratory.

Item No. 22

FIAT REPORT NO. 451

UNCLASSIFIED

GERMAN GLOVE LEATHER TANNING INDUSTRY. Reported by: G. A. Rothschild. 16p.

The introduction gives general comment on the industry, explaining the German advantage in the sale of leather goods to be cheap labor, and stating that this report is based on the industry in the American, French and British occupied areas only. Detailed reports are made on grain leather, both in alum and chrome tannage, oil tanned deerskins, and buffed calf; lists of tanneries investigated being included for the grain and oil-tanned leathers. The one producer of buffed calf is Duracher Lederwerke, formerly Hermann and Ettlinger, in Durach-Karlsruhe.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 454

UNCLASSIFIED

RECORDS OF WARTIME IMPROVEMENTS IN FIBER MANUFACTURE AND IN FIBER PROCESSING, I. G. FARBEN (BADISCHE PLANT), LUDWIGS-HAFEN. Reported by: J. F. Smith. 3p.

Research at the Badische Plant was concerned largely with textile auxiliaries, including surface-active compounds and a variety of finishing or proofing compositions. There was some work on improved tests, especially for nylon.

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FIAT REPORT NO. 456

UNCLASSIFIED

NATURE AND USES OF TEXTILE AUXILIARIES MADE BY CHEMISCHE FABRIK PFERSEE GMBH, AUGSBURG, GERMANY. Reported by: J. F. Smith. 3p.

Two of the especially important textile auxiliaries made by Pfersee were: Imprägnol (90-100 metric tons monthly in 1939) and Hydrophobol (new in 1941; monthly production in 1942 about 40-50 metric tons). Imprägnol differs from conventional wax and Al soap preparations in that it utilizes a synthetic, unsaponifiable wax from long chain hydrocarbons, and relies on Zr oxychloride as well as Al salts for its metal content. Hydrophobol is also a synthetic wax product. Formulas of other products made by this company are listed.

Item No. 22

FIAT REPORT NO. 458

UNCLASSIFIED

LEATHER GLOVE MANUFACTURING IN GERMANY. Reported by: J. A. Higier. 6p.

Lists the 14 factories visited in American, British and French occupied Germany and the one factory in Berlin, with the conclusion that equipment and fabrication methods have not progressed for many years. As a separate part to this report there is a "Report on the Leather and Fabric Glove Industry in Czechoslovakia", where indications are for a rapid export to the U.S. of leather gloves. There is some comment on the machinery for production of fabric gloves.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 460

UNCLASSIFIED

THE ASBESTOS TEXTILE INDUSTRY. Reported by: R. E. Cryor.
34p.

The purpose of this investigation was to inquire into the wartime operation of asbestos textile plants in Germany, and to determine the state of technical knowledge prevailing in the industry during the war and up to the present time. Machine output in German asbestos plants is generally much lower than corresponding American machine output, and the production much coarser and very low in quality by comparison. Asbestos textile plants in Germany are poorly organized generally, in respect to plant layout and the orderly flow of material in process. A decided absence of technical work and experimental development was noted. No new methods, machines, or labor saving devices were observed. Results of a survey of the nature of equipment and methods observed in all of the asbestos plants covered by this investigation are given in a composite picture. "Synthetic" asbestos reported in Germany is a form of fibrous glass that is produced by the Schuller process. The production of a fibrous glass material capable of being carded and spun into yarns and the development of efficient carding and spinning techniques for this fiber are the only technical achievements observed in the German industry that have not been duplicated in the United States. The opinion of all persons interviewed is that the Schuller glass fiber has been an effective substitute for asbestos, and without it the industry could not have operated, but all were unanimous that were asbestos fiber available, it would be the preferred material. The asbestos industry was the sole outlet for this Schuller process glass fiber, which process is described. The methods of processing the glass fiber into yarn, as developed by Hardt Pocorny, are also described. The appendix contains the names, addresses and historical data of the plants visited. Photographs are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 461

UNCLASSIFIED

THE FIBROUS GLASS TEXTILE INDUSTRY. Reported by: J. G. M. Leisenring. 27p.

This report covers an investigation of the fibrous glass textile industry in Germany at the close of World War II. Contrary to experience in America, uses for fibrous glass in Germany have not been developed beyond the original applications; i.e., wool fibers have been used only for domestic and industrial insulating purposes (houses, buildings, boilers, turbines, steam pipes, locomotives, Diesel engines, etc., while textile fibers have been used for only two purposes - electrical insulation and an asbestos substitute. Of the various basic processes described, the Owens and Schuller processes seem the most economically and technically sound. It is questioned whether the Gossler and Hager processes have any long range value to the German economy, and it seems rather evident that they have no value whatever to the United States. No interesting technical developments in machinery or processes in connection with production of basic fiber have been observed. The carding and spinning of the Schuller fiber by Hardt-Pocorny Company is interesting technically though of doubtful value economically to the American industry. Other fabricating processes observed such as weaving were less than ordinary based on American standards of equipment, output, and product quality. Names, locations and historical data on plants visited are given in the appendix.

Item No. 22

FIAT REPORT NO. 462

UNCLASSIFIED

INVESTIGATION OF THE GERMAN NARROW FABRIC INDUSTRY. Reported by: B. A. Holgate. 10p.

The narrow fabric industry of Germany consisted of about 1100 to 1200 plants, 50% of which were located in the Ruhr section. The plants inspected are listed in the appendix and are representative of the industry. The greatest asset of the industry was the availability of adequate cheap labor. The Guido-Horn braider was of importance due to its high rate of production and of its relatively low maintenance cost.

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FIAT REPORT NO. 463

UNCLASSIFIED

GERMAN PILE FABRICS FOR UPHOLSTERY AND WEARING APPAREL.

Reported by: J. J. Repp, Jr. 10p.

This report contains descriptions of the following processes: Preparatory processes to weaving, warp preparation, filling preparation, weaving, inspection, mending and measuring, dye and finishing processes. Looms and other machinery used are also described. Diagram of drive for hinge-box-motion is included. Only novel features in the German pile fabric industry seen were two looms made by the Glusken Loom Works-Dülken, Germany. These were sent to U.S. for further study.

Item No. 22

FIAT REPORT NO. 464 and Supplement

UNCLASSIFIED

SURVEY OF THE COATED FABRICS INDUSTRY IN GERMANY. Reported by: D. Lott and W. D. Hedger. 51p.

This report describes machinery, techniques, and materials used in manufacture of four types of coated fabrics: Oil coated fabrics; nitrocellulose coated fabrics; plasticized polyvinyl chloride coated fabrics and films; miscellaneous coatings. The investigators believe that machinery revealed no novel development. Fabrics used since the war have been almost entirely based on spun viscose rayon. Paper impregnated with one of the Buna rubbers was used as a substitute in the leather goods industry. The coating of polyvinyl chloride by the Paste method was the outstanding successful development. Report is illustrated with figures. Appendix 1 is a list of the principal synthetic plasticizers produced and their special qualities. Appendix 2 is a German evaluation of various plasticizers for vinyl polymers. Appendix 3 is a description of the method for making fleece back coatings. Appendix 4 lists the physical and mechanical properties of Luvitherm. Appendix 5 lists plants and personnel visited. Report includes drawings of types of equipment used.

Drawings and photographs of the Siemens-Schuckert oilcloth plant, production figures, and operating temperatures are given. Responsible personnel of this plant contradict several figures given in FIAT Final Report No. 464.

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Item No. 22

FIAT REPORT NO. 466

UNCLASSIFIED

TEXTILE TESTING IN GERMANY. Reported by: L. Fourt. 21p.

This report presents a general picture of textile testing in Germany, with emphasis on the effort to measure the properties of fibers, yarns and fabrics which would lead to greatest service value in actual use. It recommends that American laboratories and instrument makers should build and make available the following types of testing machine for wear testing: (1) A round tester, based on the Schopper or Bleyle tester, the results of which can be evaluated by bursting strength; (2) a flat type, like the Muller, for differential testing of warp and filling; (3) a localized abrasion tester; and (4) a flexing endurance tester, capable of performing the test with either wet or dry fabric, with the possibility of varying the tension in relation to the breaking strength of the cloth. It also recommends that physiological aspects of clothing, such as fabric warmth, the effect of fabric surface structure on the sensation of warmth, the moisture content of clothing under varying conditions of climate and activity, the effect of wind in relation to clothing layers and fabric porosity, and the like, should be studied in the United States, in relation to the various fibers used in clothing, especially cotton, wool, viscose, acetate, and nylon. A third recommendation is that a carefully planned program of service testing, in correlation with laboratory testing, should be carried on in the United States. Sources of information are listed.

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FIAT REPORT NO. 468

UNCLASSIFIED

ZELLWOLLE LEHRSPINNEREI, DENKENDORF, KREIS ESSLINGEN, WURTEMBERG. Reported by: J. L. Truslow and R. M. Jones. 17p.

This report describes the machinery used at this central testing and research institution for the German staple fiber spinning industry. The following machines are of interest: the card, drawing frame, roving frame, and spinning frame made by the Rieter Company of Winterthur, Switzerland, and the automatic filling winder made by W. Schlafhorst and Co., of Muchen-Gladbach, Rheinland, Germany. The following research projects should be completed: a metallic breast for use behind the cotton card in removing shive from staple fiber; cutting device for producing a draftable continuous sliver made up of discontinuous fibers from a tow of continuous filament synthetic yarn; nose spinning frame with extremely long bobbins applying the principles set down by Lawrence Balls of England; optimum break draft determinator which measures the power needed to unlock fibers of a roving when drafted between two pairs of rolls under varying conditions of draft, setting, and weighting; study by use of strain gauges of the principal draft and break draft on the ring spinning frame under varying conditions and with various materials. Diagrams are included.

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FIAT REPORT NO. 472

UNCLASSIFIED

MANUFACTURE OF NON-WOVEN OR COMPRESSED WOOLEN FELT IN GERMANY. Reported by: R. R. Stevens. 11p.

This is a report of an investigation to uncover any new or novel raw materials, machinery or methods used in Germany in the manufacture of non-woven or compressed woolen or part woolen felts. It was to be expected that with a supply of wool limited by stockpiling, a shortage of fat for the manufacture of necessary soaps used in felting and the necessity of using wool for its felting properties that radically new intelligence might be obtained. The scope of this report is limited to reporting on non-woven felts in sheets, wheels and rolls and does not touch upon hot body felts, papermaker blanket felts, battings, waddings and the like. Only plants that made use of the felting property of wool without spinning, knitting or weaving are covered. The number of German plants (14) investigated was sufficient to give a cross section of the industry. Report discusses raw materials, manufacturing processes, costs, industry standards, and list of plants investigated.

Item No. 22

FIAT REPORT NO. 473

UNCLASSIFIED

VEREINGTE GLANZSTOFF FABRICKEN OBERNEBURG A/MAIN. Reported by: J. L. Truslow. 8p.

This plant, the principal continuous filament rayon factory and producer of the best tire cord in Germany, was visited for the purpose of inspecting the 2 for 1 twistors. The Barmeg 2 for 1 twistors represent a new and novel commercial solution to the art of tire cord twisting that should be thoroughly investigated. This can only be accomplished by taking to the U.S. actual running samples of these machines. It is recommended that the short combination ply and cable twister in the Experimental Section together with 4 spindles from yarn twistors be evacuated. Diagrammatic sketches of the single yarn spindle and the cable twister are included.

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FIAT REPORT NO. 478

UNCLASSIFIED

COAL-TAR CREOSOTE FOR WOOD PRESERVATION IN GERMANY DURING THE WAR PERIOD. Reported by: F. W. Gottschalk. 19p.

No evidence was found to indicate that the German coal-tar distillation industry undertook any technical work with creosote during the war. As a result of curtailment of use of creosote, wood impregnating plants changed to a salt-type of preservative, such as Flunax, which was essentially sodium fluoride. The one development in the field of coal-tars for Germany, indirectly related to creosote for wood preservations, was the construction and operation in 1943 of a new continuous distillation plant. The unit distilled 8,000 tons of coal-tar per month in continuous year-round operation at a temperature of about 300°C. or less. The inventors claim such advantages as better yields, lower heat requirements and full-time operation. In Vienna, Dr. A. Nowalk was reported to be making laboratory experiments with coal-tar pitch impregnations. His process, apparently uses a solvent which is extracted for re-use after the treatment. (This or a similar impregnating process for use of certain parts of glued-up railroad cross-ties is briefly mentioned in a FIAT report "Production and fabrication of glued wood products in Western Germany", by H. O. Fleischer and R. A. Selorg, October 2, 1945). A laboratory study at the Technical High at Eberswalde is mentioned.

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FIAT REPORT NO. 480

UNCLASSIFIED

GERMAN WOOD PRESERVATIVES OTHER THAN COAL-TAR CREOSOTE, FOR THE WAR PERIOD. Reported by: F. W. Gottschalk. 42p.

Although there are a great number of wood preservatives other than coal-tar creosote on the market in Germany, they constituted only a small part of preservative chemical requirements prior to hostilities. Restrictions by the Reich government for creosote during the war resulted in a widespread need for the toxic-salt preservatives. Accordingly, Flunax, Basilit, Wolman, and zinc chloride salts were the preservatives most commonly used at the pressure treating plants. The first three of these preservatives are essentially based upon sodium fluoride. This report is one of a number prepared on forest products by the same author; other phases which have certain relationships to this report will be found in "Coal-tar creosote for wood preservation in Germany during the war period" (PB 7751) and "The wartime operation of pressure wood-preserving plants in Germany" (PB 7757). Lists of the firms manufacturing wood-preserving products are presented. The composition of investigated preservatives, fire retardants, wood preservation laboratories, shipping and mixing salt preservatives and method of pressure treating are discussed. The report concludes that, having accomplished nothing in the field of seasoning, treating methods, or handling, the German wood preservation industry during World War II was about 30 years behind the American Industry. Three appendixes accompany the report: Appendix A contains a list of references; appendix B, a list of the publications by the Biological Department of the Four Year Plan at the State Institute for Testing Materials, Berlin-Dahlem; and appendix C, a list of photographs on file at the official depository of the Forest Products Laboratory, Madison, Wisconsin.

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FIAT REPORT NO. 481

UNCLASSIFIED

COKE AND NITROGEN FERTILIZER PLANT, REICHSWERKE HERMANN GORING A. G., LINZ, AUSTRIA. Reported by: F. H. Reed.
41p.

Inspection trip of coke and nitrogen plant built in Linz, Austria in 1943. Coke plant uses high volatile (33%) Upper Silesian coal blended with Austrian and Ruhr coal for its metallurgical coke. Report contains analyses of coals used in these blends and the changes in their content as they are heated to 550°C. Operation of the nitrogen and fertilizer plant is considered essential in order to make Austria self sustaining in the production of foodstuffs. An appendix has a translation of a German report comparing five different processes of gas manufacturing for the production of 60,000 tons of nitrogen yearly. A detailed flow sheet of the nitrogen plant is included along with other charts and diagrams.

Item No. 22

FIAT REPORT NO. 486

UNCLASSIFIED

CELLULOSE ETHERS, ESTERS AND MIXED ESTERS AT BIEBRICH (WIESBADEN) ELBERFELD & DORMAGEN. Reported by: D. Traill and S. Brown. 19p.

This is a compilation of three reports previously issued separately. The first part gives the manufacture of Tylose HBR, a crude cellulose glycollic acid, and other cellulose ethers under trade name Tylose, at Biebrich. Tylose HBR is used principally as a washing agent. Tylose MGA was sold for sizing rayon. Tylose MGC is used as emulsifying agent and thickener in cosmetics, foodstuffs, ice-cream manufacture. (FIAT Final Report 321 - PB 8007). The second part gives the manufacture of the following cellulose ethers at Elberfeld: Carboxymethyl cellulose (Cellapret), benzyl cellulose and ethyl cellulose (FIAT Final Report 171 PB 7998). The third part is on cellulose esters and mixed esters at Dormagen (FIAT Final Report 172 - PB 7999).

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FIAT REPORT NO. 487

UNCLASSIFIED

MANUFACTURE OF PULP AND PAPER AND RELATED PRODUCTS FROM WOOD IN WESTERN GERMANY. Reported by: J. N. McGovern. 179p. The purpose of this investigation, which was conducted within the American, British, and French occupation zones, was to ascertain the status of the pulp and paper industry in Germany. Particular regard was paid to the production of pulp for nitration and other chemical purposes, utilization of sulfite waste liquor, manufacture of paper and paper product specialties, and pulp and paper research. Mills representing major phases of the industry were visited and individuals qualified in special aspects of the trade were interviewed. Details of manufacturing procedures used in the many branches of the industry were obtained whenever possible. The German pulp and paper industry was found in general to have been less advanced than the same industry elsewhere. Report includes manufacturing procedures, research and development data, and literature cited. Appendices give details of the visits, illustrations of equipment, and various special reports.

Item No. 22

FIAT REPORT NO. 488

UNCLASSIFIED

POLYMERIZATION OF ETHYLENE. Reported by: N. W. Krase. 29p. A translation and the original German of a progress report dated Feb. 15, 1943 by Dr. Hopff and Dr. Goebel on high pressure polymerization at I. G. Farbenindustrie A. G. The semi-technical method for continuous polymerization of ethylene in methanol at 200 atm. was improved and a plant with a capacity of 10 tons per month for the production of I. G. wax A(Lupolen N) was established at Zweckel. The method of continuous polymerization of ethylene in semi-technical-scale at 1000-3000 atm. was further improved and a plant yielding 10 tons per month was erected at Ludwigshafen. A less elastic Lupolen was obtained at 900 atm. and delivered under name Lupolen S. 3 flow charts are included.

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FIAT REPORT NO. 490

UNCLASSIFIED

STUDY OF USE OF OTHER MATERIALS THAN WOOD OR COTTON AS SOURCES OF CELLULOSE. Reported by: K. Ward, Jr. 22p.

Straw cellulose pulp was manufactured by the Phrix-Gesellschaft in their plant at Wittenberge. This was the only successful use of straw in this way. At Wittenberge there was a chain of three plants, a straw pulp plant, a staple fiber plant operating on the pulp and a food yeast plant utilizing the liquors from the pulp plant. The pulping process itself was in two stages, an acid hydrolysis for the pentosans and a sulfite cook thereafter. Many companies experimented with Arundo donax as a source of cellulose, but the only plant that carried on production (until destroyed by bombing during the war) was that of Snia-Viscosa. The pulp plant, Tor-Viscosa, was situated at Toresuino, Italy. The pulp was produced by a special bisulfite process and was used by the various plants of the Sni-Viscosa chain. Processes of pulping are described, and comments from other sources given. The following materials are discussed as sources for cellulose: Phragmites communis, rape straw, bast fiber wastes, potato vines and other materials.

Item No. 22

FIAT REPORT NO. 491

UNCLASSIFIED

GENERAL REPORT ON PROTEIN TARGETS. Reported by: A. K. Balls. 5p.

This investigation is concerned with the manufacture of food from waste materials and of protein by microbiological processes in an attempt to solve German protein shortages. Blood plasma from the slaughter houses, whey from dairies and excess fish were put into use. A powder from fish is a substitute for egg-white in cooking. The fungal proteins were used mainly for feed for animals, and were not used in large amounts for human consumption. Nutritional questions relating to their use have not received adequate attention according to the investigator.

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FIAT REPORT NO. 492

UNCLASSIFIED

AGRICULTURAL ACTIVITIES OF THE TECHNISCHE HOCHSCHULE OF MUNICH, BRANCH AT WEIHENSTEPHAN. Reported by: A. K. Balls. 9p.

The Agricultural department of the Munich Technische has for many years been located both in the Agricultural Station at Weihestephan and in Munich. During the war the parent institution was so badly damaged that most of what was left in branches related to agriculture came to Weihestephan. The U. S. Army has taken over the entire institution and it is being used as an agricultural college where American soldiers may take courses on a summer-school type of schedule in almost any branch of agriculture and in the sciences underlying agriculture. Progress is reported in the following fields: General agriculture, cereal chemistry, dairy research, agricultural microbiology, and new development in fermentation chemistry.

Item No. 22

FIAT REPORT NO. 493

UNCLASSIFIED

YEAST PRODUCTION ~~FROM~~ WOOD SUGARS BY THE BERGIUS PROCESS. Reported by: A. K. Balls. 6p.

The product of the plant, Süddeutsche Holzverzuckerungswerke at Regensburg, was a dry yeast in the form of light yellow flakes, with about 50% protein, used for horse feed. The process used small pieces of wood, usually fir, digested in 50% HCl for 28 hours, washed for an equal length of time, then concentrated until it was 60% sugar and 5% HCl, neutralized with lime, charged with nutrient salts and served as a culture for Torula utilis for a 12 hour fermentation period. The mash was dried by conventional drum dryers. 1400 tons of wood produced 500 tons dried yeast and 500 tons dried lignin briquettes. Excessive quantities of power and chemicals were required. The process was not economical and its wartime operation may have been approved on the grounds of convertability to phosgene manufacture.

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FIAT REPORT NO. 494

UNCLASSIFIED

"BACTERIAL FERTILIZER" FOR FIELD CROPS, DATA FROM DR. OTTO SIEGEL. Reported by: A. K. Balls. 5p.

A practice used increasingly by the Russians since 1932, involving the inoculation of seed with *Azotobacter chroocoeum*, was further developed, with emphasis on selective use of different strains best adapted to individual plant varieties. Of many field experiments carried out in 1944, sixty per cent gave an increase in harvest yield. Reported increases are listed for oats, barley, mustard, cabbage and potatoes. Tables are included.

Item No. 22

FIAT REPORT NO. 495

UNCLASSIFIED

ANIMAL FEEDING, MANURING, AND FRUIT UTILIZATION AT HOHENHEIM AGRICULTURAL COLLEGE. Reported by: A. K. Balls. 8p.

Experimental work has been done on the neutralization of acid silage with ammonium carbonate in order to increase its content of amide nitrogen. No practical experience on urea feeding had been done at this station, and very little feed yeast had been used although it was definitely stated that this material was all right, and had worked well throughout Germany. Extensive studies were made on manure decomposition, with particular interest in the resulting soil humus. Substitution of temperature tests for bacteriological examinations was studied. Methods of processing both unfermented juices and fermented fruit pulps for making both alcoholic and non-alcoholic beverages were conventional. Experiments were made on fruit selection as to variety, ripeness and condition when picked, and the influence of these factors on quality of the beverage.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 496

UNCLASSIFIED

WARTIME OPERATION OF PRESSURE WOODPRESERVING PLANTS IN GERMANY. Reported by: F. W. Gottschalk. 46p.

A group of 11 major treating plants and 3 special mine treating plants in Germany were investigated for wartime developments in the fields of impregnating methods, preservatives, seasoning and handling. This report is one of a number prepared by the Forest Products Sub-Committee; other phases that have a direct relationship will be found in FIAT reports as follows: "Coal-tar creosote for wood-preservation in Germany during the war period" (PB 7751), and "German wood preservatives, other than coal-tar creosote, for the war period" (PB 7753), both by F. W. Gottschalk. There is no evidence of new impregnating or conditioning methods, and no new plants or equipment have been installed since 1941. The production of the major wood-preserving plants is almost entirely railroad cross-ties, which during recent years, have been treated with Flunax, a preservative of government formulation. Appendices give brief reports on individual plants visited. Also included are the form and dimensions for the cross-ties of German state railways and specifications for coal-tar creosote used in their treatment. Photographs, diagrams and a list of references are given.

Item No. 22

FIAT REPORT NO. 497

UNCLASSIFIED

WELDING. Reported by: P. M. Hall and C. Johnson. 162p.

Key equipment plants were visited and inspected in an effort to uncover new developments in the field of welding. In general it was found that Germany was far behind U.S. and Great Britain in the designs of their standard welding equipment, and in the quality of the welds produced. This report contains details of visits to various plants engaged in arc welding, resistance welding, gas welding, and welding applications. Diagrams and tables are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 499

UNCLASSIFIED

PRODUCTION OF WOOD SUGAR IN GERMANY AND ITS CONVERSION TO YEAST AND ALCOHOL. Reported by: E. G. Locke, J. F. Saeman, and G. K. Dickerman. 119p.

The purpose of this investigation was to determine what recent advances had been made in Germany in the production and utilization of wood sugar obtained by acid hydrolysis of wood, or from sulfite waste liquor. The investigation was limited to the French, British and American zones of occupation. Part I, production of wood sugar; Part II, production of alcohol from wood sugar; Part III, production of food protein from wood sugar. Appendices give targets visited, method of conducting a percolation, and translations of reports from selected targets. Diagrams, flow sheets, photographs, references, and tables are included.

Item No. 22

FIAT REPORT NO. 500

UNCLASSIFIED

DESIGN OF ACETYLENE CYLINDER FILLING PLANTS IN GERMANY, 1945. Reported by: F. E. King. 14p.

This report describes the equipment and operating procedures of typical German plants, eight installations having been visited. The operation is felt to follow safe practices and most of the equipment appears to compare favorably with the equivalent in many plants in the U.S. As a typical plant, that of the Hanseatische Acetylen Gasindustrie at New-Isenburg, near Frankfurt on Main, is described, with appropriate notes as to differences in other plants. There is a schematic diagram of the unusual nitrogen fire control system for acetylene manifolds used by plants of the Gesellschaft für Linde's Eismaschinen.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 511

UNCLASSIFIED

ACETYLENE GENERATOR DESIGNS IN GERMANY. Reported by: F. E. King. 22p.

After noting some of the differences between practices by manufacturers in Germany and the U. S., especially with respect to pressure, the following generators are described: 1. Carbide to water - "Rekord" generator of the Autogenwerk Sirius of Dusseldorf; "OPH" generator of Messer and Co., Frankfurt on Main; 2. water to carbide - the generator of Nordgas, Hamburg; "Heco-Normal" generator of E. Endress, Stuttgart, also sold by Peter Corres, Frankfurt on Main; and the plant of Wendtland and Herbst, Hamburg, on which no information was available; 3. water recession - "HEV" generator of Messer and Co., and others by Perkeo-Stahl of Ludwigsburg; Acetylenwerk Ebersbach-Fils of Ebersbach; and J. v.W. Müller of Opladen; 4. dry generators - Griesheimer Autogen Verkaufs of Griesheim and Elektrowerk Knapsack of Knapsack near Cologne; and 5. generator of Elektrochemische Gesellschaft of Walshut. Drawings.

Item No. 22

FIAT REPORT NO. 513

UNCLASSIFIED

STUDY OF HYDROGEN AND METHANE PRODUCTION FROM COKE OVEN GAS I. G. FARBENINDUSTRIE, A. G., HOCHST A/MAIN. Reported by: F. H. Reed. 65p.

Pure hydrogen (98.2%) and pure methane (98.4%) are obtained by passing coke oven gas through a Linde separation plant. 52% of the raw gas from the grid is recovered as hydrogen and 18% as methane. The remaining 30%, including propane and butane fractions, is returned to the grid. Complete operating directions for the equipment are given (in German) in the Appendix. These directions are accompanied by four figures showing flow diagrams of the layout of the plant.

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FIAT REPORT NO. 518

UNCLASSIFIED

ROAD AND AIRFIELD CONSTRUCTION. Reported by: D. W. Winkelman. 40p.

This report covers four main subjects for Germany: Soil stabilization, the Autobahn; airfields; and equipment used on above types of construction. Soil stabilization with cement; bituminous stabilization of earth and settling soils by vibration are discussed. The settling or impacting of soils by the use of vibrators is known as the System Kellar. The method was used for the construction of the submarine assembly plant and pens near Bremen. Specifications, excavation and embankments, sub-grades-drainage, pavements, bridges and structures, landscaping and safety control features of the Autobahn are reviewed briefly. The construction of airfields before and during the war years is also discussed. A list of persons and places visited, and photographs of operations mentioned in the report, are included.

Item No. 22

FIAT REPORT NO. 519

UNCLASSIFIED

THE GERMAN CEMENT INDUSTRY. Reported by: M. A. Swayze and G. G. J. Davis. 46p.

Report of investigation to determine what advances have been made by the German cement industry preceding and during the war. A critical appraisal of cement quality and manufacturing methods in a group of plants in the British and American areas of occupation is reported as well as concrete quality in both mass construction, small projects, highways and precast concrete products. Diagrams are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 520

UNCLASSIFIED

SYNTHETIC EGGWHITE FROM CODFISH AND SHRIMP, DEUTSCH EIWELISS GMBH. Reported by: A. K. Balls. 8p.

This plant manufactured a synthetic protein preferably from fresh filets of codfish although dried codfish and steam-dried shrimp were used. The process consists of removing readily soluble proteins with dilute acetic acid, extracting lipids with trichlorethylene, stirring the extracted tissue in warm dilute sodium hydroxide, neutralizing the partly hydrolysed protein with acetic acid, and spray drying into a white powder. One analysis of the powder showed that it contained 93.9% protein, 4.65% water, varying percentages less than unity of salt, calcium oxide, total ash, lecithin phosphoric acids, total phosphoric acid, 0.003% of organically bound iodine and a trace of fat. The product is a substitute for egg white for both food and technical uses, and is reputed to have superior whipping qualities, but seems to retain a slight taste of fish.

Item No. 22

FIAT REPORT NO. 521

UNCLASSIFIED

MOLD GROWTH FROM SPENT SULPHITE LIQUOR AT ZELLWOLLEWERKE LENSING. Reported by: A. K. Balls. 8p.

The plant was investigated regarding its process for using the mold, Oidium lactis in spent sulfite liquor for protein production. The product was sold chiefly as a constituent of sausages. About three tons a day could be produced. The report describes the deep vat batch process, which could no doubt be developed into a continuous process. The protein content was variable, sometimes reaching a high yield of 45% and sometimes only 25-30%, the balance being mainly chitin and cellulose. Only 3% fat was produced but more could be obtained if a longer growth period were permitted. Bacterial infections hindered the process and yeast infections almost completely inhibited production of the protein food. This plant was ready to give up this process and convert to the Berguis process for producing yeast protein from wood sugars. Diagram of the vat, rotating drum and agitator are shown. Growth curves are also included.

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FIAT REPORT NO. 528

UNCLASSIFIED

LIGHT SENSITIVE REPRODUCTION MATERIALS. Reported by: S. Scavuzzo. 90p.

The investigations covered by this report embrace the field of light sensitive reproduction materials used for the photo reproductions of drawings and documents of the engineering industry. In this group belong light sensitized materials using the diazo compounded dyes for direct positive reproductions by dry and moist development, negative sensitized materials composed of iron salts, and negative brown and sepia reproduction materials composed of silver bichromate and iron salts. The sensitizing formulas of a number of firms were obtained but the data obtained from Kalle & Co. are the most important and are discussed at length.

Item No. 22

FIAT REPORT NO. 536

UNCLASSIFIED

FUSED QUARTZ MANUFACTURE IN GERMANY. Refer to Item No. 21 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 542

UNCLASSIFIED

TEXTILE EDUCATION IN GERMANY. Reported by: W. D. Fales. 39p.

This report contains ~~the text of PB 3892 (Bibliography, Vol. II, p. 150), with the addition of a foreword by William D. Fales,~~ a chart showing the plan of organization of a German textiles school, and a list of 59 German textile schools, giving location and nature of curriculum.

Item No. 22

FIAT REPORT NO. 545

UNCLASSIFIED

PULLING WOOL BY THE USE OF ENZYMES. Reported by: H. D. Grimes. 4p.

By the use of an enzymatic product called Arazym NSL, wool can be removed from pelts without detriment to the wool fibers or to the hides. This process of pulling wool from sheepskins was developed by the Röhm and Haas Company of Darmstadt who are the manufacturers of the enzyme product named Arazym NSL

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FIAT REPORT NO. 546

UNCLASSIFIED

WOOL SCOURING, WOOL GREASE RECOVERY AND OTHER BY PRODUCT RECOVERY IN GERMANY. Reported by: H. D. Grimes. 12p.
During the war, synthetic alternatives were used for scouring to take the place of soap which was not available. The general mechanics of the scouring process agree essentially with U. S. practices except that the wool is given a rinse in water only, before the usual scour with soap. This is done to recover the water soluble potash salts. The recovery of wool grease is mandatory to prevent pollution of streams, the cost of recovery exceeding its selling price.
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FIAT REPORT NO. 547

UNCLASSIFIED

THE ITALIAN HEMP INDUSTRY. Reported by: B. B. Robinson and C. W. Schoffstall. 15p.

The hemp industry of Italy is largely under the control of a national organization, Consorzio Nazionale Canapa, the main office of which is in Milan, with branch offices in Bologna, Rome, Naples, etc.: This organization appears to be closely associated with the Linificio e Canapificio

Associazione, the head office of which is also in Milan. The organizations fix the prices for the various grades of fiber and appear to control through purchases and manufacturing operations about 85% of the raw fiber hemp industry of Italy. The fiber of the raw fiber hemp grown in Italy is principally prepared on small farms as a peasant industry. The production in Italy has not become industrialized to any great extent as it has in many countries where the retting and cleaning of the fiber is carried on as a factory process. As a result the methods followed and the machinery used are very primitive and require a great amount of hand labor. There are no steps in the production that can be considered worthy of recommendation for adoption in the United States. Tables present raw hemp prices for the northern areas and for the Naples area of Italy. Principal persons interviewed are listed.

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FIAT REPORT NO. 548

UNCLASSIFIED

PREPARATION OF FLAX AND HEMP FIBERS IN GERMANY. Reported by: B. B. Robinson. 19p.

The methods and machines used in the German raw flax, and hemp fiber industries are in general similar to those used in other countries where the preparation and cleansing of these fibers have been industrialized and are no longer peasant industries. The reduction by mechanical means of the water content of wet flax straw after removal from a retting tank has received the attention of inventors and processors for many years. The use of pressure rollers is not new but their employment on a large scale as practiced in Germany is none too common. The proper understanding of their effect on the quality of this fiber is so conflicting that their use is worthy of note for American processors where the employment of some similar method might be of value for winter retting. Differences between flax and hemp, and flockenbast and cotton are discussed. Machines for the preparation of flax and hemp fibers, as well as chemical processes used in the preparation of flockenbast, are described. The method of determining the class and price of straw based on a point system is shown in tabular form. A list of factories and research organizations used as sources of information are included. Photographs of raw materials, photograph of Lindner flax harvester and diagram indicating machines and steps used in the preliminary cleaning, chemical cooking, mechanical after-opening and spinning of mixed flockenbast and staple rayon are shown.

Item No. 22

FIAT REPORT NO. 549

UNCLASSIFIED

THE BELGIAN FLAX INDUSTRY. Reported by: B. B. Robinson and C. W. Schoffstall. 16p.

This report covers a brief survey of the Belgian flax industry to see changes that have occurred because of the war, to learn to what extent supplies of fiber were available in Belgium at present, and to compare the industry there with the German industry. Table I shows the grades of flax fiber adopted in Belgium during the German occupation; tables 2-5 show the imports and exports of straw flax, scutched flax and flax straw and fiber. Photographs of three machines are included.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 550

UNCLASSIFIED

A GERMAN FINISH FOR SPUN RAYON FABRICS COMBINING WATER REPEL-
LENCY, CREASE RESISTANCE, AND LOW RESIDUAL SHRINKAGE.

Reported by: G. D. Jackson, Jr. 4p.

While the process described in this report is in the ex-
perimental stage, it is worth noting in that the Germans
have first produced a thick, sudy, full hand by chemical
shrinkage rather than trying to obtain the whole quality of
the hand by a final resin treatment. Further study of this
process is recommended.

Item No. 22

FIAT REPORT NO. 553

UNCLASSIFIED

CELLOPHANE AND SAUSAGE CASINGS MADE AT KALLE & CO., WIESBADEN.

Reported by: W. Wade. 11p.

A detailed analysis of the processes and apparatus for the
manufacture of cellophane and cellulose sausage casings from
viscose as used by the Kalle & Company, A.G. of Wiesbaden-
Biebrich, Germany, is presented in this report. Viscose for
both of these products is made in a single building and with
the same equipment. For the manufacture of cellophane, Kalle
has six machines, the rated capacity of five machines being
about 240 tons per month. In the cellophane spinning machine,
stationary porcelain tubes are used for all submerged rolls
except in the desulfurizing bath. One cellophane machine is
equipped with two novel hoods made of sheets of polyvinyl
chloride. In general, the process and apparatus for making
sausage casings used by Kalle is conventional, but porcelain
tubes are also used for the submerged rolls. In drying the
smaller casings, the inflated tubing is lapped and passes
five times through the drying chamber. With eight casing
spinning machines, Kalle has a rated capacity of 12,000,000
meters of casings per month. A brief bibliography is included.
Samples of the above mentioned cellophane and sausage casings
are available for testing at the Textiles Section of the
National Bureau of Standards. PB 25557 is a supplement to
this report containing drawings of the machinery used by Kalle
and Company.

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FIAT REPORT NO. 554

UNCLASSIFIED

RAYON WEAVING AND THROWING IN GERMANY. Reported by: E. C. Geier. 29p.

This report on the rayon weaving and throwing industry in Germany concerns itself chiefly with the usage and application of filament yarns, and does not embrace the staple or spun rayon field. Descriptions are given of the following novel developments or methods which merit attention: 1. The double-twist spindle (Doppel Draht) specifically designed for high twist crepe throwing (Barmag); 2. the hollow-spindle used as a combination up-twister-doubler (Kugag); 3. the three-deck up-twister for rayon or silk crepe yarns (Hamel & Company); 4. the loom without a superstructure built by Ruti, Elmag, Saurer; 5. the plastic heddle to replace the steel heddle (Fentin & Guilleaume); 6. the Kreuzwalken apparatus to increase density (picks) in fabrics (Sächsische Webstuhlfabrik); 7. the printing of aviators' maps particularly for night flying printed in a textile print shop (Ver-seidag); 8. the continuous process of cupra yarn from spinnerette to warp beam or spools (J. P. Bemberg). The appendices contain drawings and diagrams of some of these novel developments and methods, a price list for German rayon yard for November 1945, a description of Patent No. 740024, "Method of producing durable, especially multi-colored maps", and a description of "Wollin" faorics as adopted for civilian purposes. A list of the plants visited is included.

Item No. 22

FIAT REPORT NO. 555

UNCLASSIFIED

THE DYEING OF HOSIERY IN GERMANY. Reported by: T. B. Smith. 5p.

Hosiery made of natural silk reinforced with mercerized cotton or stockings made of artificial silk (rayon) and mercerized cotton are dyed in Germany mostly on mechanical dyeing apparatus and only rarely in smaller lots by hand suspending on sticks. Two main types of mechanical dyeing apparatus are being used; apparatus similar to the Smith-Drum rotating drum system, and systems in which the stockings are suspended on sticks by means of threads passed through the heels. The stockings of artificial silk had to be cleaned before the dyeing by means of the usual cleaning agent on the basis of alcohol-sulphonates or fatty acid condensation products in connection with fat solvents.

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FIAT REPORT NO. 556

UNCLASSIFIED

SOME ASPECTS OF RAYON AND SYNTHETIC FABRIC DYEING AND PROCESSING IN GERMANY AND AUSTRIA. Reported by: G. D.

Jackson, Jr. 60p.

German plant equipment is in many instances unique, clever and well designed. The speed of these units is slower than would be acceptable under American operating economy, and labor employed is excessive. Dyeing equipment is particularly well designed, but their becks are too small for our larger production lots. A novel arrangement of pads, jigs, and quetschs in one plant is reported herein. No new developments were observed in acetate dyeing and since Perlon was relatively new, acetate type dyestuffs were still in use where small amounts of this fiber had been dyed. Appendices contain reports of the following textile dyeing and printing plants: Württembergische Kattun Manufactur at Heidenheim, Württemberg; Neue Augsburger Kattun Fabric at Augsburg, Bavaria, Germany; Bleicherei, Faberei und Appretur Anstalt Utingen A. G.; Gabriel Herose A. G., Konstanz, Germany; Baumwollindustrie Erlangen-Bamberg A. G.; and Calico und Kunstleder Werki. Also included are diagrams of an open width desizing tank, glass enclosed beck, cross section of porcelain beck rod, pad, jig, and quetsch range, and "vat acid" and "elektrofixier" range.

Item No. 22

FIAT REPORT NO. 557

UNCLASSIFIED

PRODUCING DURABLE EMBOSSEING ON RAYONS AND A MACHINE FOR COLORING EMBOSSED FABRICS (WITH COLORING FORMULAE BY I. G. FARBENINDUSTRIE). Reported by: G. D. Jackson, Jr. 7p. At the laboratories of I. G. Farbenindustrie at Hoechst, Germany, a method of producing wash-fast embossings on spun rayon fabrics was observed by the textile dyeing team. Urea formaldehyde and melamine resins as well as formaldehyde can be applied to a spun rayon fabric, the fabric then embossed and cured, resulting in a durable embossing which will withstand washing. A machine was designed and was in production for coloring the low areas of embossed fabrics, which effect was obtained by applying the color to the relief areas of one of the embossing calendar rolls immediately before the roller turned against the cloth being embossed. To this machine was added another slide printing device which would rub color on the high points of the embossed fabrics.

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FIAT REPORT NO. 561 and Supplements

UNCLASSIFIED

SOME ASPECTS OF THE FULL FASHIONED AND WARP KNITTING INDUSTRY IN GERMANY. Reported by: M. Winkler and H. G. Fiedler.

This is a list of samples obtained in an investigation of the full fashioned and warp knitting industry in Germany, reported in PB 14523, page 966 of this Bibliography. These samples are now available for inspection at the U. S. National Bureau of Standards. Included are samples of circular knit underwear fabric, rayon underwear, rayon hose, heavy circular knit hose, a runproof fabric made on circular spring needle machine, 2-way stretch bathing suit fabric. Also included are a number of samples which are not knitted, including 15 samples of fur imitation, two samples of fine corduroy, and fabric gloves with leather palms. These samples were obtained from Heinzelmann & Co., Reutlingen, Württemberg; Vereinigte Strumpffabriken, Kulmbach, Bavaria; Minthorst & Schulte, Krefeld; Alber-Bitzer, Tailfingen, Württemberg; R. Vollmoeller Inc., Stuttgart-Vaihingen; and Gebr. Haaga, Stuttgart.

Item No. 22

FIAT REPORT NO. 565

UNCLASSIFIED

CONSULTATION WITH THE NORWEGIAN AUTHORITIES IN REGARD TO PROCESSING AND QUICK FREEZING OF FISH. Reported by: G. Berg. 5p.

Visit in September to Norwegian authorities and to plant of "Frost Fillet" at Trondheim. This plant was designed by Solo Feinfrost, G. m. b. H. at Bahrenfeld-Hamburg in conjunction with Nordsee-Hochsee Fischerei at Wesermünde, Germany. Besides the administration, subjects considered are: Handling, filleting, packaging, freezing and storing.

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FIAT REPORT NO. 567

UNCLASSIFIED

GERMAN PECTIN INDUSTRY DURING WORLD WAR II. Reported by:

Z. I. Kertesz. 34p.

This report gives a detailed summary of the German pectin industry, German policy laws relating to pectin and production statistics are given. A brief evaluation of the important personnel and manufacturing plants in the German industry is presented. Preparation and preservation of pectin from apple pomace and beet cossetts are described. It is concluded that the American pectin industry has little to learn from its German counterpart. The manufacture of beet pectin is the only major development during the war years. Two pharmaceutical preparations were made, "Sango-Stop", an antihemorrhagic agent and "Sanguron" an antidiarrheic preparation. Both are known in the U.S.

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FIAT REPORT NO. 568

UNCLASSIFIED

SOME DEVELOPMENTS IN THE AGRICULTURAL SCIENCES IN HUNGARY DURING WORLD WAR II. Reported by: Z. I. Kertisz. 13p. Report discusses plant breeding, agronomy and soils, biochemistry, vitamins and food technology.

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FIAT REPORT NO. 571

UNCLASSIFIED

SUMMARY OF INVESTIGATORS REPORTS ON TECHNICAL INDUSTRIAL FOREST PRODUCTS DEVELOPMENTS IN GERMANY. Reported by: C. P. Winslow and D. G. Coleman. 64p.

The U. S. Forest Products Investigators collectively reported on over 300 companies, institutions, etc. and interviewed nearly 300 individuals throughout Germany and Austria except in the Russian-occupied territory. The targets investigated covered modified and improved wood, glues and plywood, engineering and wood structure, pulp and paper, wood preservation and seasoning, alcohol and yeast, forestry and sawmill equipment, and miscellaneous targets. The following new or improved developments in Germany which are of real significance to U.S. wood industries and to research in forest products are described: Improved technology for the rapid continuous fermentation of alcohol or protein yeast for food from wood sugar in sulfite pulp liquor and from wood sugar factories; development of a neutral resin adhesive (Polystal); development of techniques for the production of bleached beech sulfite pulp of high alpha cellulose content and its use for cellulose nitrate; application of prehydrolysis to pine pulp chips followed by kraft pulping and the production of a pulp 100 percent for cigarette paper; use of nitric acid for producing purified pulps of high alpha content; and the use of resin impregnated wood retainers for high-speed ball and roller bearings.

Item No. 22

FIAT REPORT NO. 572

UNCLASSIFIED

RESIN FILLED FIBERBOARD OF THE HOLIG HOMOGENHOLZ-WERKE.

Reported by: C. P. Winslow. 17p.

This is a report of production processes and planned output at the new Baiersbronn (Germany) plant of the Holig Homogenholz-Werke, a Swiss-owned concern producing "homogeneous" wood, a resin-filled fiberboard. An appendix contains references to other reports on the same subject, titles of supplementary documents deposited in the Forest Products Laboratory, Madison Wisconsin, and extensive notes on the properties of homogeneous wood, besides a page of diagrams of the machinery and apparatus used in the initial defibrating process.

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FIAT REPORT NO. 606

UNCLASSIFIED

OPPANOL (POLYISOBUTYLENE) MANUFACTURE AT THE OPPAU FARBEN WORKS. Reported by: J. W. Livingston. 8p.

This report is an investigation of the production and control of oppanol B, or polyisobutylene which was used by the Germans as a natural rubber substitute for manufacturing cable, impregnating fabrics, for adhesives and for water-proofing. Oppanol was superior to natural rubber for many applications because it is not affected by light.

Item No. 22

FIAT REPORT NO. 607

UNCLASSIFIED

POLYMERS AND COPOLYMERS AT I. G. FARBEN, LUDWIGSHAFEN, SUPPLEMENTAL REPORT. Reported by: J. W. Livingston. 16p.

This report supplements two previous documents reported in volume I of this Bibliography, PB 176, p. 25, and PB 4287, p. 458. The Ludwigshafen plant was again visited in June 1945. Some additional information was obtained regarding Buna S-3, Koresin, ethylbenzene derivatives including styrene polystyrene, and divinyl benzene, styrene catalyst, and some brief research investigations.

Item No. 22

FIAT REPORT NO. 608

UNCLASSIFIED

OXIDATION OF METHANE TO FORMALDEHYDE: INTERROGATION OF DR. KARL SCHMITT OF BERGWERKS GESELLSCHAFT, HIBERNIA, A. G., AT HERNE. Reported by: P. W. Sherwood. 6p.

A process is described for the partial oxidation of methane by ozonized oxygen. The reaction is said to take place at atmospheric pressure, with an O_2/CH_4 ratio of 40:60 and at a temperature of 110°-120°C. The catalyst is not very active below 110°C, and above 120°C oxidation tends to go beyond the formaldehyde stage. The raw materials for the process consisted of methane (approximately 70% from the separation of coke-oven gas) and Linde-Frankl oxygen (about 98%) which was ozonized to an ozone content of 0.5 - 2.0 vol. %. The preparation of the barium peroxide catalyst is also briefly described. A drawing of Dr. Schmitt's two-pass ozonizer is shown.

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FIAT REPORT NO. 617 and Supplement

UNCLASSIFIED

THE ELECTRICAL AND TECHNICAL CERAMIC INDUSTRY OF GERMANY.

Reported by: R. Russell, Jr. 144p.

Each section of this report includes a brief summary of a German factory working with ceramics. The manufacture of sintered refractory oxide parts, particularly sintered alumina, is well advanced. Sintered alumina bodies are used for all aviation and automotive spark plugs in Germany, whereas porcelain is still used for many automotive spark plugs in U. S. The methods of processing the alumina bodies is similar to U. S. practice, but the methods of fabricating the spark plug insulators by dry pressing or casting are less suitable than the two special pressing methods used most widely in U. S. The use of small amounts of magnesium fluoride to promote the development of the desired fine crystalline structure is of interest, as is also the use of fused but not calcined alumina by the leading spark plug manufacturer. Much consideration has been given in Germany to the possible of ceramics in gas turbines, and further work is outlined. The regular and special steatite insulations manufactured in Germany are similar in quality to U. S. steatite ceramics, but only the special steatites are recommended for high frequency application, whereas in U.S. regular steatite is widely used. Other developments of interest are: A low voltage porcelain of very low total shrinkage, semi-conducting and paramagnetic ceramic materials; a special type resistor for high temperature heating; ceramic-organic plastic tapes of high dielectric constant; moldable mica products; sintered boron carbide; porous filter medium for a wide variety of applications; and a vibratory method for fine comminution of hard ceramic materials. The data presented in this report were obtained from German personnel, and it was not always possible to check their accuracy.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 618

UNCLASSIFIED

THE STATUS OF SYNTHETIC RUBBER RESEARCH AND POLYMER

EVALUATION. Reported by: C. S. Marvel. 47p.

The report covers a survey of recent research studies in synthetic rubber in Germany and reflects the opinions of German scientists looking toward improvement of synthetic rubbers. This material is the result of interviews with representatives of the I.G. Farbenindustrie at Ludwigshaven, Huls and Leverkusen, and of the Continental Gummi Werke at Hannover. The most promising research leads that were discovered are the Buna 4 development and Ludwigshaven and the Redax system of polymerization developed at Leverkusen. Exhibits appended to report include: 1. The titration of the internal and terminal double bonds in polymers of butadiene and its homologues with perbenzoic acid. (I. G. Farben, Ludwigshafen. Translation). 2. Definition of the K-value. 3. The heat sensitization of Buna-latex with Igevin M-50. (I. G. Farben, Leverkusen). 4. Preparation of Buna solutions for viscosity measurements. (Translation). 5. Leverkusen comparison of GR-S vs. German Buna. 6. Concerning fractionation of Buna solutions. (Translation). There is also a brief note by J. N. Street on experience with German built synthetic tires.

Item No. 22

FIAT REPORT NO. 619

UNCLASSIFIED

WALDHOF PROCESS FOR PRODUCTION OF FOOD YEAST. Reported by: J. M. Holderby. 6p.

The Waldhof process is perhaps the most outstanding development in the field of yeast production in that it puts yeast growing on a continuous basis and apparently offers a mechanical solution to the problem of foamy substrates. It was first put into operation at Mannheim-Waldhof A.G., and since installed in some six other locations. Neutralization of waste sulphite liquor, yeast growing tanks, defoaming centrifuge, and yeast separation and concentration are discussed in this report. It is concluded that this process was obviously frozen at an early stage of development, and that considerable work remains to be done before its full capabilities are revealed. Appendices list German personnel interviewed, targets visited, and reports transmitted to Washington.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 641

UNCLASSIFIED

REPORT ON THE INTERROGATION OF GERMAN SCIENTISTS REGARDING QUARTZ CRYSTALS AND OTHER PIEZOELECTRIC MATERIALS. Reported by: A. C. Swinnerton. 20p.

It was learned from German scientists that the quartz synthesis by Nacken is most promising. The other scientists' attempts to grow quartz were not successful. The growth of substances other than quartz progressed to a degree but could not be considered highly successful. The growth of $\text{NH}_4\text{H}_2\text{PO}_4$ (ammonium dihydrogen phosphate) fell far short of the success obtained in the U. S. The principal movement in the quartz industry during the war was the conservation of raw quartz by drastic reduction in the size of oscillator plates.

Item No. 22

FIAT REPORT NO. 643

UNCLASSIFIED

DYEING AND FINISHING OF WOOLENS AND WORSTEDS IN GERMANY. Reported by: H. D. Grimes. 13p.

The purpose of the work covered by this report was to procure information concerning procedures used in the dyeing and finishing of woolens and worsteds in Germany. Raw stock and yarns are dyed in non-pressure types of circulating equipment and in pressure types of circulating machines, using the same types of dyestuffs and procedures as are used in America. Considerable stainless steel equipment is used in the yarn dyeing machines. Piece dyeing was carried on in the usual types of dye kettles, and the conventional dyeing procedures and dyes were used. Finishing equipment in all instances was rather old. All processes, except the drying of fabrics, were conducted on the batch basis. No evidence of attempts to finish or dye goods on a continuous basis was found. List of woolen and worsted plants investigated is included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 644

UNCLASSIFIED

OBSERVATIONS ON DYEING AND FINISHING METHODS IN GERMANY.

Reported by: C. N. Rabold. 173p.

Since much of the information presented came from the laboratories of I.G. Farbenindustrie, it may be considered the latest on application techniques. Plants were poorly laid out with considerable hand labor in each operation. There were few indicating thermometers on drying machines, although bleaching and dyeing formulae were very exact as to times, temperatures and concentrations. The dyeing industry is conscious of fast colors, a large part of the work being dyed with indanthrene, anthrosol and naphthol colors. Developed colors are more commonly used than direct colors. For shrinkage, some fabrics were loop dried and short framed, others were shrunk by overfeeding onto pin tenters, and some were set with urea or melamine resins or by a formaldehyde treatment. Tables, graphs and diagrams are included.

Item No. 22

FIAT REPORT NO. 645

UNCLASSIFIED

THE DYEING OF SPUN RAYON AND RAYON FILAMENT YARN IN MECHANICAL APPARATUS IN GERMANY. Reported by: T. R. Smith. 19p.

Generally speaking, the machinery for dyeing packages, cheeses and beams in pressure machines in Germany has not advanced as far as in the U.S. with one exception, where rayon cakes have been dyed in a new machine developed jointly by Dr. Diem at the I.G. Farben Rayon Plant in Rottweil and Obermaier and Company of Neustadt on the Haardt, near Mannheim. One new method of vat-dye application, known as the "Kuepensaeure" developed by I.G. for the dyeing of vat colors on rayon, both spun and filament, is given in detail in Appendix 2. Formulas are included.

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FIAT REPORT NO. 646

UNCLASSIFIED

POLYAMIDE FILMS MANUFACTURED BY KALLE & CO., A. G.,
WIESBADEN. Reported by: W. Wade. 11p.

This report is a detailed study of the process employed by Kalle & Company, A. G. of Wiesbaden-Biebrich for the manufacture of films from linear polyamides. This plant has two large casting machines and one small experimental machine on which films are prepared by casting a solution of the polyamide on an endless copper band. The only polyamide employed comprises an interpolymer of 60% of an adipic acid - hexamethylene diamine resin and 40% of an amino-caprolactam polymer dissolved in an organic solvent. After evaporation of the solvent the film is stripped from the band, the operation being continuous. Production was begun in August 1940, the product being used during the war in the form of sheets for the protection of the armed personnel from exposure to gas attack. The rated production is about 25 tons/month.

Item No. 22

FIAT REPORT NO. 648

UNCLASSIFIED

DRYCLEANING IN GERMANY: WACKER MACHINES AND PROCESSES.

Reported by: W. D. Appel. 14p.

The equipment, processes, and solvents for drycleaning as commonly carried out with equipment and chlorinated solvents manufactured by Dr. Alexander Wacker, Gesellschaft für elektrochemische Industrie G.m.b.H., are described briefly.

Trichloroethylene is used for heavy work, perchloroethylene for delicate fabrics. No soap is used in the solvent.

Water soluble stains are removed by spotting after cleaning.

Over-all loss of solvent is 10 to 12 percent of the dry weight of the garments for trichloroethylene.

Item No. 22

FIAT REPORT NO. 649

UNCLASSIFIED

CATALYSTS FOR THE MANUFACTURE OF PHTHALIC ANHYDRIDE AND ANILINE, I. G. FARBENINDUSTRIE, A. G., LUDWIGSHAFEN.

Reported by: R. W. Nash. 17p.

This report gives details on the manufacture and use of catalysts in the I. G. Farbenindustrie plant at Ludwigshafen for the production of: (1) phthalic anhydride from naphthalene; and (2) aniline by hydrogen reduction of nitrobenzene. Schematic diagrams of the processes are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 650

UNCLASSIFIED

SUPPLEMENTARY INVESTIGATION OF THE NEW (1944) WEHRMACHT ALL PURPOSE MILITARY BOOT. Reported by: C. H. Nathan. 20p. This report amplifies information contained in the preliminary Wehrmacht specifications and previous reports which are listed in bibliography attached to this report. Production of this boot had not gone beyond pilot stage. Details on contemplated specifications are based on Wehrmacht conference meetings copies of the ones for Nov. 23, 1944 and Dec. 15, 1944 being attached to this report. The McKay process is used to manufacture this boot. An attached drawing shows the pushing transport method employed and a list of machines employed shows sequence of operations, daily capacity of each machine and the age and sex of the worker employed in each operation. Use of a pyroxolin coated rayon box toe and use of "grain side out" for the quarter of the boot are significant points of German technology. List of persons interviewed and targets visited are also appended.

Item No. 22

FIAT REPORT NO. 651

UNCLASSIFIED

THE MANUFACTURE OF PAPER TUBES, BOBBINS AND CONES IN GERMANY. Reported by: F. M. Steadman. 48p. Reports the manufacture of paper tubes, bobbins and cones for the Textile Industry, contains specifications for paper, adhesives, and the most widely used items, outlines manufacturing procedure, also reports miscellaneous related items. Five appendices are included containing a list of German personnel interviewed and targets visited; a bibliography; a list of samples forwarded to Washington; and ten selected DIN standards for tubes, bobbins, and cones used by the textile industry.

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FIAT REPORT NO. 652

UNCLASSIFIED

CONTROL OF SWELLING OF VISCOSE RAYON. Reported by: C. Schlatter and R. Bouvet. 15p.

The application and value of formaldehyde treatments for the control of the swelling of rayon are discussed, together with the general methods of testing. The views of Professor Egon Elöd (Director of Research, Textilforschungsinstitut, Badenweiler) on swelling versus specific gravity of the fiber are noted, with the information that he is hopeful of developing a new rayon of increased wet strength, obtained by a higher specific gravity produced by a new method of spinning. He believes that a rayon with a uniform and slightly higher density would have better properties.

Item No. 22

FIAT REPORT NO. 653

UNCLASSIFIED

CUPRAMMONIUM PROCESS SYNTHETIC RAYON IN GERMANY. Reported by: J. I. Taylor. 17p.

This report reviews the processes used in the manufacture of cuprammonium rayon fibers and summarizes the significant developments in this field during the war years. The information was obtained from I. G. Dormagen and J. P. Bemberg A. G., Barmen. Six photographs illustrate the following: (1) Continuous spinning machine for cuprammonium rayon; (2) second bank of spinning funnels (rear of same machine as fig. 1); (3) washing machine; (4) tank for oil preparation with rollers; (5) system of 3 rollers behind the dryer and part of the apparatus for moistening the rollers; and (6) the winding machine. FIAT Final Report 34 (PB 1120, v. 1, p. 70, this Bibliography), entitled "Preparation of cuprammonium spinning solution and special processes at I. G. Farben, Dormagen", by G. P. Hoff and others, describes details of auxiliary processes as well as the staple process. See also BIOS Final Report 1380, item 22 entitled "Continuous spinning of cuprammonium rayon at J. P. Bemberg, Wuppertal and I. G. Farbenindustrie, Dormagen by A. R. Knight and others.

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Item No. 22

FIAT REPORT NO. 655

UNCLASSIFIED

SYNTHETIC SAPPHIRE AND SPINEL PRODUCTION IN GERMANY. Refer to Item No. 9 for a complete listing of this report.
Item No. 22

FIAT REPORT NO. 665

UNCLASSIFIED

GERMAN FERTILIZERS AND SOIL FERTILITY. Reported by: K. D. Jacob. 47p.

No important new developments either in fertilizer manufacture or in soil fertility research and practices were disclosed in Germany. Chemical nitrogen fertilizers are manufactured in Germany chiefly by fixation of atmospheric nitrogen as calcium cyanamide and principally ammonia. In comparison with practice in the United States, manufacture and use of compound and mixed fertilizers in Germany is not on an extensive scale. Considerable use is made of plant and animal residues and wastes in the preparation of composts and organic fertilizers. Peat is an important constituent of many of these products. Soil fertility investigations conducted in Germany during recent years include: The use of rapid chemical, biochemical, and biological methods for evaluating the fertility status of soils; the effects of boron, manganese, copper, zinc, vanadium, chromium, titanium, and other so-called minor or trace elements on the growth and development of plants; nitrogen fertilization of plants by means of Azotobacter; relation of humus to soil fertility, especially with reference to reactions involving humus and the clay constituents of soils; and statistical studies of crop responses to applications of potash. Appendix A lists organizations and individuals in the fertilizer and related industries, institutions and individuals engaged in soil fertility work, and libraries and depositories of soil science literature, that were visited for purposes of this report. Appendix B describes the manufacture of Rhenania phosphate by Kali-Chemie A. G. Appendix C gives the composition and characteristics of principal chemical fertilizers produced in Germany, including tables. Appendix D presents a selected list of publications relating to soil fertility. Appendix E, "Production and consumption of fertilizers in Germany," was not included in this report, but was sent to Food and Agriculture Subcommittee, Washington.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 681

UNCLASSIFIED

THE PAINT, VARNISH, AND LACQUER INDUSTRY OF GERMANY.

Reported by: H. O. Farr, Jr. 66p.

German paints, varnishes, and lacquers, before 1938, were similar to American products. After this date important changes developed, primarily as the result of shortages of oils, natural resins, and certain pigments. Adequate substitutes were found in most instances through the research and development of I.G. Farben and other firms, and through the use of domestic or "ersatz" materials. Emphasis in this report is placed on information which might be novel to American industry and which might lead to improved and less expensive protective and decorative organic coatings. The report covers the following topics: Organization and operation of the industry; raw materials; water paints and emulsion type coatings; nitrocellulose lacquers; synthetic coatings; air-dry urea and phenolic coatings; coatings for light metals and aircraft; marine paints; chemical resistant coatings; synthetic resins; lead cyanamide; and coating systems for selected items such as cans, fuel tanks, and cables. Appendices include a list of targets visited, a list of the leading wartime German manufacturers, and sources of information. There is also a drawing of a two-roll mill.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 710

UNCLASSIFIED

THE GERMAN SEWING THREAD INDUSTRY. Reported by: H. F. Schiefer and R. T. Kropf. 37p.

This report consolidates reports made by the authors and issued as FIAT final reports, mimeographed for limited distribution. The first section is a summary of the industry as whole (FFR-315). The German sewing thread industry produced a total of approximately 8,000,000 kilograms of thread products per year amounting to an annual sales of approximately 100,000,000 marks. During the war the production and sales were approximately 150% of normal. Normally the products consisted of sewing threads, darning threads, and art needle threads produced from cotton, linen, silk, and rayon. During the war cotton was cut off and threads were made primarily from spun rayon and from high strength rayon as well as smaller quantities of linen and silk. The production methods and equipment used throughout the industry are quite conventional, and follow the usual designs. The distribution and sales of the industry is primarily handled by sales syndicates. It is estimated that these syndicates handle 90% of the business. The German thread industry has not sponsored fundamental or applied research. When such work has been required, it has been referred to outside organizations. Some research has been done, however, and outstanding research has been presented briefly in the second section (FFR-307). Sections 3-9 cover the following manufacturers: Albert Aug. Knapp at Pfullingen (FFR-304); A.G. Mez, Freiburg (FFR-305); Zwirnerei Ackermann, A.G., Sontheim (FFR-308); A. Schradin & Co., Reutlingen (FFR-309); Amann & Söhne, Bönningheim (FFR-310); Zwirnerei and Nähfadenfabrik Göggingen, A.G., Göggingen (FFR-311); and Gättermann A.G., Gutach (FFR-312). Within the sections are SKR numbers referring to Schiefer-Kropf Reports, listed in full in Appendix III. Appendix I consists of notes on personnel, Appendix II is a government regulation and Appendix IV a bibliography of available documents and list of samples.

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Item No. 22

FIAT REPORT NO. 712

UNCLASSIFIED

MANUFACTURING PROCESS FOR DESMODUR R. Reported by: N. A. Copeland and M. A. Youker. 8p.

I. G. Farben makes four types of isocyanates under the name of Desmodur. Type R, the newest product is the tri-isocyanate from triamino triphenyl methane. A brief summary of the procedure follows: $\text{HC}(\text{C}_6\text{H}_4\text{NH}_2)_3$ is reacted with 3 mols COCl_2 to give $\text{HC}(\text{C}_6\text{H}_4\text{NCO})_3$ plus 6 mols HCl . The reaction is carried out in chlorobenzene in 3 stages - first at 5°C (3-4 hours) then at 5° to 50°C (5-6 hours) and finally at $105\text{--}110^\circ\text{C}$ (12 hours). The insoluble by-product is removed by filtration, the chlorobenzene removed by distillation and a 20% solution of the triisocyanate prepared in methylene chloride and sold as Desmodur R. A yield of 88% is obtained. A flow sheet illustrates this process and another flow sheet shows the apparatus for the recovery of phosgene. Lead-lined agitator and reactor kettles are used, but they felt that stainless steel could be used. Care must be taken not to use metals which would bring about polymerization. The operation of the reactors, filtering system, still for recovering chlorobenzene standardization kettle, phosgene recovery and hydrochloric acid absorption are described. Desmodur R is used for special adhesives and for bonding rubber to metal and rubber to tire cord. This report is typewritten and may not photograph well.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 713

UNCLASSIFIED

CELLULOSE ACETATE MANUFACTURE AT SCHERING A. G., BERLIN.

Reported by: F. J. Myers. 14p.

The production of "Triacetate-Folie" is described. This is produced only by the Schering A.G. and is a special cellulose acetate film, used for cable wrapping, reported to be outstanding because of its unusual heat resistance. Cellulose (cotton linters or alpha cellulose from wood pulp) is treated in a glacial acetic acid bath for five hours. The acid is then drained. A special charging mixture is then used consisting of 40 parts acetic anhydride, 20 parts H_2SO_4 , 40 parts benzene and $1/2\%$ $HClO_4$, based on weight of cellulose. The cellulose is still in the wool form and the benzene is important in preventing solution as the acetylation process progresses. This is called the key to the whole process. Maximum theoretical possible acetylation of 62.5% is obtained, which the Schering officials claim is responsible for the excellent electrical properties. Complete removal of the catalyst ($HClO_4$) is effected by keeping the acetate in the wool form, this resulting in markedly improved heat resistance. It is also claimed that the dye used for coloring (Ciba Blue 2R) has a definite stabilizing effect. A diagram of the acetylating equipment is included. Also included is a report, in German, of the process for the production of the cellulose triacetate, by Dr. Hinz, and a sales booklet also in German on its properties and uses.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 714

UNCLASSIFIED

CASTING OF PLEXIGLAS, ROHM AND HAAS GMBH, DARMSTADT.

Reported by: F. J. Myers. 12p.

This report presents a description of the new method of casting plexiglas in use at Rohm and Haas G.m.b.H., Darmstadt. The primary aim of this new method was to produce sheets for the German aircraft industry which were as close to optically perfect as possible. The development work was carried out at the request of the Luftwaife, and plans were made for the manufacture of several larger scale units. The experimental unit, producing plexiglass sheets 700 x 1000 mm. (any desired thickness) was manufactured by Krupp. After they were bombed, the manufacturing project was taken over by Becker Van Hüllen (Krefeld) because of their reputation for building precision machinery. The wooden patterns and the drawings for the machine to produce sheets 1700 mm. x 2000 mm. (67 in. x 79 in.) were made at Röhm and Haas, but the machines were never completed. A description is also given of a process developed by Röhm and Haas for cracking methylmethacrylate scrap, refining the crude monomer, and reusing this monomer for polymerizing to methylmethacrylate resin. Cracking and refining processes are sketched. Photographs and drawing of casting machine are included. A list of the literature on file with JIOA Microfilm Unit (refer to reel C-101), including a complete set of drawings for machine for casting optical grade plexiglass, is given.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 715

UNCLASSIFIED

ION EXCHANGES, COATINGS, AND PLYWOOD RESINS AT I. G. FARBEN-INDUSTRIE, TH. GOLDSCHMIDT A. G., PERMUTIT A. G., AND CHEMISCHE WERKE ALBERT. Reported by: F. J. Myers. 59p. The important German producers of ion exchange and coatings resins were interviewed and this report presents a representative if not complete picture of German practice. Some information on plywood resins is also included. Much of the report is concerned with "Wofatit" ion exchange resins. A visit to the I. G. Farbenindustrie Wolfen plant resulted in obtaining the following: Diagram of Bemberg copper recovery unit (for recovery of copper from cuprammonium process waste waters); preparation of Wofatits (report in German, being signed by Dr. Wassenegger, Wolfen, July 31, 1945), Wofatit M being the only anion exchanger; diagram of Wofatit plant; Wofatit M production equipment (diagram); sketch of typical Wofatit unit; questions on Wofatits (answers by Dr. Richter); questions pertaining to the construction of "Wofatite" filters, being a translation of an article by Dr. Richter, Wolfen, Oct. 18, 1940, entitled "Konstruktive Fragen beim Bau von Wofatitfiltern". Additional information on Wofatits and other ion exchange resins was obtained by visits to other I. G. plants, a visit to the Permutit A. G., Berlin, and the interrogation of Dr. Arthur Splittgerber, Berlin, consultant on water conditioning in Germany. The scope of application of the Wofatits was quite varied and great emphasis was placed on nonwater conditioning uses. The I. G. Filmfabrik plant at Wolfen was also visited to obtain details of silver recovery from waste solutions resulting from photographic film manufacture. The process is described in an article in German by Mr. Rössler, and drawings are included. Otto Jordan, Griesheim, was interrogated regarding the plasticizing of polyvinyl chloride and air-drying urea-formaldehyde coatings. The Chemische Werke Albert, Wiesbaden-Biebrich was visited regarding their coating resins. The report gives the manufacturing procedures for all their important coating resins and some plywood resins. This includes Albertols, Durophens, Alftalats, Alresats, and Alresenes. A report, in German, describes the manner in which their glue "Albert-Leimharz 319J" is to be used. Information is also contained in this report concerning Tego glues manufactured by Th. Goldschmidt A. G., Essen. These are thermosetting phenol-formaldehyde resins used for bonding wood to aluminum or aluminum alloys.

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FIAT REPORT NO. 716

UNCLASSIFIED

ALKYLAMINE MANUFACTURE AND RESEARCH AT AMMONIAKWERK
MERSEBURG GMBH. Reported by: 26p.

1. Amines, Alkyl—Production—Germany 2. Amines,
Alkyl—Research—Germany

Item No. 22

FIAT REPORT NO. 717

UNCLASSIFIED

BUNA RUBBER RESEARCH. Reported by: M. A. Youker and N. A.
Copeland. 50p.

The objectives of this investigation were to determine (1) whether the Germans had discovered a better synthetic rubber than Buna S-3 and (2) in what direction they were working to obtain a better rubber. It was learned that Buna S-3 was still the best general purpose synthetic rubber. However, it was believed that a butadiene polymer would prove superior to the copolymers with styrene and research was in that direction. They believed also that more work should be done on butadiene copolymers, other than those with styrene, using low temperature Redox systems. There is some discussion on Buna M, Buna K and other copolymers. The appendix lists (1) Kauko Index 1937 through 1944, the Kauko being the I. G. commission for polymerization and (2) Kauteko Index, the Kauteko being the corresponding commission for technical applications and testing, (3) list of Field Investigation Reports, and (4) list of Leverkusen research documents available in Washington. This is a report of the Rubber Subcommittee Mission, Joint Intelligence Objectives Agency, to the Office of Rubber Reserve, Reconstruction Finance Corporation.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 718

UNCLASSIFIED

FERTILIZERS MADE BY I. G. FARBENINDUSTRIE A. G., AT LEUNA AND PIESTERITZ. Reported by: R. B. McMullin. 57p. This report incorporates a detailed description of the processes, together with flowsheets for ammonium sulfate, ammonium nitrate, Leuna-Salpeter (NH_4NO_3 -38%, $(\text{NH}_4)_2\text{SO}_4$ -62%), Kalk-Ammon-Salpeter (NH_4NO_3 -60%, CaCO_3 -40%), Stickstoff-Kalk-Phosphat (nitrogen, lime, phosphate, -16%N, 16% P_2O_5 , 22% CaO), Leuna Nitrophoska (12% N, 12% P_2O_5 , 21.5% K_2O), Piesteritz Nitrophoska (five types are mentioned with varying amounts of N, P_2O_5 , and K_2O), and Kalk-Salpeter ($\text{Ca}(\text{NO}_3)_2$ - 82%, NH_4NO_3 - 5%, H_2O - 13%). In addition to fifteen flowsheets and a drawing, the appendices include the Stickstoff-Kalk-Phosphat equipment list and the complete analysis of Nitrophoska A. Additional documents (in German), supplementary to this report, are listed below: Miscellaneous Chemicals or M.C. drawings 23 and 24, Spray machine for making fertilizers in prill form from Ammoniakwerk Merseburg G.m.b.H., appear as PB 52309; M.C. 25 and 26, Spray tower for making fertilizers in prill form from Ammoniakwerk Merseburg G.m.b.H., as PB 52310; M.C. 76, 77, and 78, Flowsheet, crude nitric acid from I.G., Bitterfeld, as PB 49536; M.C. 79, Description of process for crude nitric acid by Gruber and Beyer, as PB 49539; M.C. 80, Cost sheets, 1st quarter 1944, ammonia gas, raw nitric acid, platinum catalyst, sodium nitrate from the I. G. Farbenindustrie Surefabrik, Bitterfeld, as PB 49540; M.C. 81, Memorandum on plant improvement (nitric acid) by Beyer, as PB 49541; and M.C. 86, German documents on fertilizer processes at Leuna and Piesteritz, as PB 49542.

This crude nitric acid is to be used for making ammonium nitrate, calcium ammonium nitrate, and sodium nitrate. The document most likely derives from I.G. Farbenindustrie Bitterfeld, and includes I.G. methods of analysis of ammonia, determination of yield of nitric acid and safety precautions to be used in production of ammonia and nitric acid. This memorandum outlines the necessary steps for the improvement of the process for making nitric acid and probably derives from I.G. Farbenindustrie, Bitterfeld. Mention is made of ammonia gas, ammonia oxidation, catalyst, acid pumps, and the materials used for the flow of gas and acid.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 719

UNCLASSIFIED

GERMAN NEOPRENE. Reported by: M. A. Youker and N. A. Copeland. 30p.

This typewritten report mainly describes production at Hoechst of mono-vinyl-acetylene (MVA), its chlorination to form 2-chloro-1,3-butadiene (chloroprene or CD) and the polymerization of DC to form neoprene. Chloroprene and neoprene were considered by some German investigators to be superior in some respects to Buna. However, plant rivalries and Buna commitment limited neoprene production to pilot plant size and development. Flow sheets show the various steps in the production of MVA from acetylene and the chlorination of MVA to form CD. In the chlorination process only about 20% MVA used was chlorinated in one pass, so as to limit formation of byproducts. A high boiling oil was removed as soon as it formed since it helped convert CD to dichlorobutylene. The gases were also treated to obtain additional CD. A formula for the polymerization at Hoechst is given and the polymerization process described. In general, Elmo pumps were used for handling acetylene or MVA. Doctor Wollthan at Huls described some work done at Oppau and said that Oppau was primarily concerned with the synthesis of MVA as a basis for aliphatic chemicals and butadiene. Two plants at Zlin in Moravia which had been taken over by the Germans were visited. These produced about 60 tons of chloroprene per month but had capacity for only 30 tons of the polymer. A batchwise, emulsion polymerization process was used. No details were obtained regarding the polymerization but samples of chloroprene and neoprene were found either more pure or better than that produced by Hoechst. Not much work was done in Germany on stabilizers for neoprene. Experiments to produce good copolymers with chloroprene were not successful. Neoprene though was found to "weld" very well and was recommended for tire carcasses. Germans impregnated paper to make a good synthetic leather substitute. Curing bags for rubber tires made of neoprene lasted twice as long as natural rubber curing bags. Neoprene was also used for gaskets, packing, the cementing of rubbers, for coating metals, textile fibers and textile coating.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 720

UNCLASSIFIED

GERMAN TECHNIQUES FOR HANDLING ACETYLENE IN CHEMICAL OPERATIONS. Reported by: N. A. Copeland and M. A. Youker. 130p
Report discusses development of fundamentals in this field as well as applications. Covers experiments by Dr. Ing. Boesler, Dr. Rimarski, Dr. Weissweiler and Chemische Technische Reichsanstalt and some work performed at the Reppe laboratory.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 722

UNCLASSIFIED

SYNTHETIC RUBBER DESMODUR "R". Reported by: W. Lee. 9p, This report discusses the development and use of Desmodur "R", a synthetic adhesive material used for bonding rubber to fabric in the manufacture of tires. It was made by I.G. Farbenindustrie A.G. at their Leverkusen plant near Cologne. Desmodur "R" can be used on standard spreading machines, is said not to be toxic, and indications are that it will not be expensive. It can be used on rayon and nylon fabrics without shrinking or stiffening the cord appreciably. The formula for the dough, the process of dipping and the tests are given. It can also be used for bonding rubber to metals and many other miscellaneous uses. Photographs are included.

Item No. 22

FIAT REPORT NO. 723

UNCLASSIFIED

GERMAN CARBON BISULFIDE MANUFACTURE. Reported by: B. H. Wilcoxon. 51p. The two processes used commercially in Germany for producing carbon bisulfide, namely the retort processes developed by I. G. Farbenindustrie at Premnitz and by Zahn and Co. at Berlin, are described and compared. The report is based chiefly on information obtained at two plants, one at Gelsenkirchen (A. G. für Chemische Industrie), which uses the I. G. process, and one at Heufeld, which uses the Zahn and Co. process. The appendices include diagrams of the two types of retorts and the method of gas analysis at Heufeld together with a bibliography, the latter listing a number of M.C. drawings.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 724

UNCLASSIFIED

MISCELLANEOUS CHEMICAL PROCESSES AND PLASTICS MACHINERY.

Reported by: E. W. Halbach. 43p.

Part I of the report presents a comparison of the two important Ludwigshafen styrene types, Type III and Type IV polymers, giving consideration also to the question of the most economic coloring of the products. This part includes a report (in German) of the Schkopan method of preparing Type KF, an essentially pure polystyrene. Part II deals with polystyrene molding compounds including their color. Several other plants in Germany were visited regarding production of polyvinyl chloride sheeting and the results appear in Part III. The production of sheeting, such as mipolan, produced at Troisdorf, is identical with U.S.A. calendar practice. Special type sheeting as Moser mill process and paste casting on belt for thickness of .015"-5/16" deserves attention. Part IV describes the status of plastic zipper production in Germany. In general, American methods have gone beyond the German since German plastic zipper production had come to a virtual halt during the war. A description and diagram also describes the spreading of a polystyrene film to produce "Styroflex". Two schematic diagrams for producing polystyrene polymers and a diagram for making polyvinyl chloride paste sheeting are also included.

Item No. 22

FIAT REPORT NO. 728

UNCLASSIFIED

A. G. FUR STICKSTOFFDUNGER, KNAPSACK. Reported by: A. S. Fromholz and B. H. Wilcoxon. 20p. Describes the Knapsack continuous process for the manufacture of calcium cyanamide and furnished equipment construction details. Tabulated pertinent data on German production of calcium cyanamide. Briefly evaluates German production of dicyandiamide during the war period.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 729

UNCLASSIFIED

THE GERMAN HIGH TEMPERATURE COAL TAR INDUSTRY. Reported by: E. O. Rhodes. 165p.
Forty German targets in all four occupation zones were visited regarding recent advances in the German high temperature coal tar industry. These targets included producers and users of these products, selling organizations, equipment manufacturers, and research organizations. In the summary (Part I of the report) advances in equipment, methods, products, and uses of the products that have taken place in this industry within the last ten years are enumerated and briefly discussed. Most of the items mentioned are discussed in greater detail in the individual target reports (Part II). The appendix lists the quantities of crude tar processed by the tar distillers in 1941, 1942 and 1943 and also the origin of the tar supplies. Several designs of tar stills are shown; these cover vacuum batch systems, continuous vacuum systems, and a continuous atmospheric system. The products studied include hard pitches, roofing and waterproofing pitches, road tars, electrode pitches, carbon black, anthracene, naphthalene and phenol recovery, lubricant oil and greases, phenol and alkyd resins, phthalic anhydride, cresol and others.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 732

UNCLASSIFIED

ELECTROCHEMICAL OPERATIONS AT I. G. FARBENINDUSTRIE, A. G. BITTERFELD. Reported by: R. B. MacMullin. 123p. This report fully describes the electrochemical operations at Bitterfeld. The products reported on operations include (1) chlorine and alkali, (2) calcium hypochlorite or "Perchloron", (3) chlorates and perchlorates, (4) magnesium electrolysis, (5) light alloys, (6) calcium metal, and (7) contact rectifier. The amalgam plant at Bitterfeld North for the production of chlorine and caustic soda is one of the most modern in Germany and was worth studying, chiefly from the viewpoint of plant layout and successful operating procedure. The calcium hypochlorite process was licensed by an American Company and is in operation in the United States. There is no evidence of advancement of German practice beyond American practice with the exception of the process for recovering dry calcium chloride in granular form from the waste calcium hypochlorite liquor. The process for producing the alkali chlorates and perchlorates differs to a considerable degree from American practice and has accordingly been carefully reported. The metallic magnesium plant at Bitterfeld is the oldest and least efficient in Germany. With the exception of a new and rather large chlorinator for making magnesium chloride there is nothing of interest. The light alloy plant is excellent, but not better than the best American plants. The machine for continuous casting of cylindrical billets is, however, very good. Calcium metal is produced only on a very small scale and there is not much of interest here for American manufacturers. The contact rectifier, mentioned in other reports, is reported herein. This rectifier is of particular interest to the electrochemical industry because of its high efficiency at comparatively low voltage. This rectifier has already been described in PB 23859, v.2, p. 412. An analysis of the rectifier is contained a German article by Floris Koopelmann, published in Elektrotechnische Zeitschrift, jg. 62, p. 3-30 Jan 2, 1941, and reproduced in this Bibliography as PB 46967 (FIAT Miscellaneous Chemicals Drawing 74). Appendix A consists of tables showing the production costs for chlorine and caustic soda production by the amalgam and Billiter plants.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 733

UNCLASSIFIED

VERTICAL RETORT ZINC AND BY PRODUCTS. Refer to Item No. 21 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 737

UNCLASSIFIED

ECONOMIC STUDY OF GERMAN SYNTHETIC WAXES. Reported by: J. V. Steinle. 34p.

This report describes the production methods for Montan wax and other I.G. waxes. It includes 13 pages of general production data and details of present production possibilities and 19 pages in German giving full shop method data for waxes at two I.G. Farben plants.

Item No. 22

FIAT REPORT NO. 741

UNCLASSIFIED

CATALYSTS FOR COAL HYDROGENATION. Reported by: P. W. Sherwood. 6p.

This report describes the preparation of ten coal hydrogenation catalysts developed by I.G. Farben at Ludwigshafen which were not described in FIAT Final Report 422. These catalysts are as follows: Benzination Catalysts 6108, 6109, and 8754; Aromatization Catalysts 7019, 7495, and 8688; Prehydrogenation Catalyst 7846; Dehydrogenation Catalysts 7994 and 8074; and Cracking Catalyst 6752.

Item No. 22

FIAT REPORT NO. 743

UNCLASSIFIED

"K-3" SILICON DIOXIDE FOR RUBBER FILLER. Reported by: C. H. Love and F. H. McBerty. 17p.

This report is the result of visits to the establishments in Germany of the "Degussa" or Deutsche Gold und Silber Scheide Anstalt located at Frankfurt am Main and Rheinfelden. The manufacture of white amorphous silica (of particle size 0.1 to 1.0 microns) is described, involving chlorination of 90% ferrosilicon and burning of silicon tetrachloride with hydrogen and air. The silica smoke is collected on a revolving drum. Possible uses are: as a replacement for carbon black in rubber; for transparent high temperature lubricating grease; for thickening acids.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 744

UNCLASSIFIED

SALICYLIC ACID. Reported by: B. H. Wilcoxon. 9p.
This report covers a description of the process for making salicylic acid from phenol and carbon dioxide at I.G. Farbenindustrie, Leverkusen. In the process, phenol is reacted with caustic and the resulting phenolate is treated with CO_2 to form the sodium salt of salicylic acid. This solution is acidified and the precipitated acid filtered off, washed, dried and sublimed. An overall yield of 90-92% based on phenol and the refined salicylic acid is obtained. Particular attention was paid to construction details of the sublimers and main reactor. Diagrams of the sublimers and reactor are given.

Item No. 22

FIAT REPORT NO. 746

UNCLASSIFIED

SYNTHETIC MICA RESEARCH: Reported by: Paul M. Tyler 22p.
Investigations on the production of synthetic micas in the laboratories of the Kaiser Wilhelm Institute for Silicate Research and Siemens Schuckert are described and the conditions found to be necessary for successful results are given. Results of some fifty tests are included. The German research has now gone far enough to demonstrate that it should be possible to produce synthetically the entire national needs of the United States for condenser mica. Perfectly clear elastic block mica up to 400 cm^2 in area and absolutely free from defects has been produced. Photographs, diagrams, a schematic drawing of a furnace, electron interference pictures, and a bibliography are appended.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 747, 748, 749.

UNCLASSIFIED

THE SYNTHESIS OF FLUORINE-MICA OF THE PHLOGONITE GROUP, CRYSTALLOCHEMICAL AND MICROSCOPIC INVESTIGATIONS OF SYNTHETIC PHLOGOPITES: AND GESETZMAESSIGE VERWACHSUNGEN VON SYNTHETISCHEM PHLOGOPIT MIT MINERALIEN DER HUMITGRUPPE (REGULAR INTERGROWTH OF SYNTHETIC PHLOGOPITE WITH HYDROUS MICA). Reported by: W. Eitel. 107p.

This is a series of three reports on synthetic mica research by Dr. W. Eitel and co-workers of the Kaiser Wilhelm Institute for Silicate Research at Berlin-Dahlem and Ostheim Rhoen, Germany. A process for the production of synthetic mica on a laboratory scale was developed. practical details involved in the synthesis are set forth. Potash-magnesia mica and barium mica were made in small crucibles. To produce well oriented crystals, particular importance was placed on well regulated temperatures, gradient in a vertical direction during the first of the cooling period and a magnetic field surrounding the crucible in a horizontal direction. the basic crystallographic theories are discussed with complete descriptions of the results of various melts in the phlogopite series.

gives the results of crystallographic studies of synthetic phlogonite and the rules governing intergrowth of phlogopite and humite crystals are derived. Included are tables, diagrams and explanatory photo-micrographs.

Item No. 22

FIAT REPORT NO. 757

UNCLASSIFIED

PRODUCTION OF POTASSIUM PERMANGANATE AND MANGANESE CHLORIDE. Reported by: B. H. Wilcoxon. 28p.

This report covers the electrochemical production of potassium permanganate at I. G. Bitterfeld, the only such plant in Germany. Pyrolusite is used as the source of manganese dioxide. The use of hydrogen for the internal firing of the kilns appears novel. A detailed description of the process is given together with flow sheets of the present process and of a proposed plant. Raw material, labor requirements and costs are included. The report also describes the production of manganese chloride from manganese dioxide (from pyrolusite) and hydrochloric acid. A flow sheet illustrates this process. Bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 762

UNCLASSIFIED

NEW PLASTICS FOR GERMAN AIRCRAFT (STRUCTURAL MATERIALS, GLAZINGS, AND PAINTS.) Reported by: J. T. Grey. 11p.

Four organizations were visited in order to ascertain new developments in plastics, particularly structural materials, glazings, and protective paints. Professor Stauder of the University of Freiburg has concluded as a result of his studies that macromolecules with numerous short branches will produce the best results as adhesives. Professor Schmidt, a consulting chemist, explained his ideas on the mechanism of gluing with phenolic resins. His contentions that glues which coagulate bond efficiently and that foams must have fibrous supports in the cell walls are considered promising. The Holzverkohlungs-Industrie A. G. (H. I. A. G.) had developed, on a semi-commercial scale, a plastic material comprised of pentaerythritol and acrolein, which was considered as a substitute for Plexiglas, but was not adopted. Substituted amines had been successfully used for promoting the polymerization of methacrylic esters in the presence of organic peroxides. "Bits" comprised of sintered alumina had been developed for machining plastic materials. The items produced by Gustav Ruth were nitrocellulose dopes, zinc chromate primers, and anti-fouling paints. A new method of producing nonhydrolyzing anti-fouling paints through the use of inorganic complexes was described. Formulas for various coatings are given in an appendix.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 764

UNCLASSIFIED

DYESTUFFS MANUFACTURING PROCESSES OF I. G. FARBEN INDUSTRIES.
Reported by: F. O. Robitschek. 350p.

This report presents indices of the dyestuffs manufactured by I. G. Farbenindustrie, the manufacturing details of which are recorded on microfilm. Several of these microfilms have been received by OTS, and they will be abstracted in subsequent issues of this Bibliography; the other reels will be reported as they are received. Each of the products listed is an individual chemical and no blends are included. The first part of the document is an alphabetical register of the German dyestuffs; the second part is a systematic manufacture register of the dyestuffs arranged according to dyeing characteristics and color. The two indices contain for each item the German name, percentage of uncut material, percentage of sales type material, place of manufacture, reel and frame number of the microfilm where its preparation is described. Whenever possible, reference is made to "Schultze's Farbstoff Tabellen." The systematic division of dyestuffs used is of I.G. origin; it comprises 16 main groups, each group representing certain end use and application characteristics. Each of the primary divisions is divided into the various family groups, and each of the family groups again into the specific type within that family. An index to the systematic register precedes that part. The introduction to the report also contains an evaluation of the German industry, including a table which gives production of dyestuffs by type in the years 1937 and 1943. It is also stated that the Astrazon colors seem to present a new type of dyestuff; the Astrazon colors are water soluble dyestuffs for acetate silk, having lively shades and good fastness to light and washing. The appendices include a bibliography and a list of the Astrazon samples evacuated to Washington. This copy of the report will not reproduce well. Therefore, copies are being reproduced inexpensively. When these are available, this abstract will appear again in this Bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 768

UNCLASSIFIED

PHENOL MANUFACTURE IN GERMANY BY THE CHLORINATION, SULFONATION AND RASCHIG PROCESSES. Reported by: R. H. Krieble. 64p.

A comparative study is presented of the three processes which are in use today, for the manufacture of phenol. In one process, chlorobenzene is made by the chlorination of benzene, and hydrolyzed to phenol with aqueous sodium hydroxide at high temperatures and pressures. This is the most straightforward process. In another, benzene sulfonic acid is made by the treatment of benzene with excess 100 percent sulfuric acid and is fused with sodium hydroxide at high temperatures in open pans to give phenol. This process is the classical one and its economy is largely dependent on the market for the byproduct sodium sulfite. In the third process, chlorobenzene is made by the catalytic reaction of hydrogen chloride, benzene, and air. The chlorobenzene is subsequently hydrolyzed at high temperatures by steam in the presence of a catalyst, thereby producing phenol and regenerating hydrogen chloride. This process involves two reactions, each of which operates at a low conversion per pass. It is the most efficient in regard to consumption of raw materials but involves serious corrosion problems. Operating data and equipment lists are included together with flow diagrams, detail drawings and a bibliography.

Item No. 22

FIAT REPORT NO. 771

UNCLASSIFIED

CLAY MINING IN THE WESTERWALD DISTRICT OF GERMANY. Reported by: G. W. Josephson. 11p.

Briefly describes methods of mining and processing used at mines of Müllenbach and Thewald and at Gewerkschaft Otto Mine (formerly operated as Gewerkschaft Landeweher) in the Westerwald district. Three general types of clay are produced: Fire, ceramic and enamelling (vallengard). A copy in German of the patent for a new type of clay cutter used at Gewerkschaft is included. Photographs and a table showing products of Müllenbach and Thewald giving chemical analyses of the clays are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 774

UNCLASSIFIED

ANHYDROUS CHLORIDES MANUFACTURE. Reported by: F. H. McBerty. 32p.

Equipment and process details are given for the German manufacture of anhydrous chlorides by high temperature chlorination at several I. G. Farbenindustrie plants. Operations described are: Aluminum trichloride at Ludwigshafen; iron trichloride at Bitterfeld; silicon tetrachloride at Rheinfelden; titanium tetrachloride, zirconium tetrachloride and zirconium oxychloride at Leverkusen. As appendices there are enclosed flow diagrams and cross-sections of the chlorination retort.

Item No. 22

FIAT REPORT NO. 788

UNCLASSIFIED

ALUMINUM HYDROXY CHLORIDE PRODUCTION AT LUDWIGSHAFEN BY ELECTROCHEMICAL AND CHEMICAL METHODS. Reported by: W. C. Gardiner. 8p.

Aluminum chloride solution is electrolyzed in a diaphragm cell to give chlorine, hydrogen, and any one of three compounds, $\text{Al}(\text{OH})_2\text{Cl}$ and $\text{Al}_2(\text{OH})_3\text{Cl}_3$ which are tanning agents and $\text{Al}_2(\text{OH})_5\text{Cl}$, a water repellent for textiles. The electrolytic products are spray dried to hygroscopic powders. Less satisfactory chemical processes were developed after the electrolytic plant was bombed. Flow sheets and a diagram of the hydroxy-chloride cell are given.

Item No. 22

FIAT REPORT NO. 789

UNCLASSIFIED

EXPERIMENTS TO PRODUCE DUCTILE SILICON. Reported by: J. S. Smatko. 8p.

The information described in this report was obtained by the interrogation of Dr. Walter Bieberschick, formerly affiliated with the Technological Hochschule of Vienna. The report describes the preparation of silicon about 99.98% pure, and its testing for ductility. Practically no ductility was observed, but Dr. Bieberschick felt that if the percentage of oxygen (as an impurity) were decreased, the ductility might be improved. The research on this problem was in an early stage. A diagram of the equipment is included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 790

UNCLASSIFIED

PRODUCTION OF SODIUM SULFIDE FROM SODIUM AMALGAM. Reported by: W. C. Gardiner. 1op.

The production of sodium sulfide by the reaction of sodium amalgam with sodium polysulfide, as practiced at I. G. Höchst and I. G. Ludwigshafen, is described. Both 30% and 60% Na_2S solutions can be made directly. The design of the reactor, which is credited with the success of the process, is described and illustrated by a diagram.

Item No. 22

FIAT REPORT NO. 793

UNCLASSIFIED

TECHNICAL EXPLOITATION OF THE GERMAN CHEMICAL INDUSTRY. Reported by: B. H. Wilcoxon. 63p.

Includes bibliography of CIOS reports I-XXXI, relating to the chemical field

I. Chemical industries—Reports—Index—Germany

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 794

UNCLASSIFIED

THE PORCELAIN ENAMEL AND CERAMIC COLOR INDUSTRY IN GERMANY.
Reported by: C. J. Herbert 71m

This report reviews the information obtained during an investigation of German porcelain enamel and ceramic color plants and laboratories, and summarizes the most important developments of this industry, which were in most cases caused by a lack of conventional raw materials during the war. With respect to porcelain enamels, the frit "V26", containing titanium, is used in all borax-free enamels in Germany, and is said to be the outstanding development that kept the German enamel industry alive during the war. With respect to ceramic colors, production and research in this field were at a virtual standstill during the war, due to the fact that the coloring oxides of cobalt, nickel, manganese, cadmium, etc., were put to more effective uses in the armament program. Generally speaking, the observed plant layouts and manufacturing methods are considered to be obsolete and inadequate according to American standards. Research laboratories are said to be well equipped and adequately staffed by competent personnel. The report contains information pertaining to manufacturing methods, control tests, plants and general observations. In addition, the appendices contain: Lists of plants visited and personnel interviewed and a bibliography; translation of an I. G. Farben, Leverkusen, handbook, dated November 1941 and entitled "Vitreous enamel formulae based on V-26 boron-free flux containing titanium dioxide"; an illustrated abstract of an article by A. Dietzel and R. Bonke, entitled "Opacification of porcelain enamels with titanium dioxide," being a report of the Kaiser Wilhelm Institute für Silicatiforschung, Berlin; formulae for enamels, for ceramic colors (body and glazes), glass enamels, jewelry enamels, etc., which in many cases represent experiences gathered over long periods of time; and a translation of a paper by Dr. Ihwe, of Avergesellschaft, Berlin, pertaining to the production of the rare earths of the ytterbium group, including also erbium and yttrium. Eight illustrations. Mentioned in the bibliography are FIAT Microfilm Reels 155 and 156 which will be available at a later date as PB 20547 and PB 20546, respectively. Also mentioned are frames 4845-4848 of Reel 159, including German patent application T 60670 VIb/80a, which will be available as PB 33807.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 796

UNCLASSIFIED

BICHROMATES MANUFACTURE. Reported by: F. H. McBerty and B. H. Wilcoxon. 61p.

Manufacture in three plants of I. G. Farbenindustrie in Germany is described: Potassium bichromate and chrome alum at Bitterfeld and sodium bichromate at both Leverkusen and Verdingen. Special features include an unusual annular hearth kiln, a three-step reaction using lime only in third step, and acidification to bichromate using carbon dioxide under pressure. As exhibits there are enclosed cross-sections of the ring furnace and carbonation autoclave, photograph of ring furnace charging side, schematic diagrams of equipment, equipment list and performance comparisons as between Leverkusen and Verdingen.

Item No. 22

FIAT REPORT NO. 797

UNCLASSIFIED

THE ELECTROLYTIC CHLORINE PLANT IN HOECHST ON MAIN. Reported by: J. S. Smatko. 62p.

The processing of chlorine, hydrogen, caustic soda, sodium hypochlorite, brine, hydrochloric acid and sodium sulfide are described in complete detail for Höchst, supported by cost figures comparing other plants and by a flow sheet. Appendix I includes a table giving chlorine production in all Germany plant by plant for the years 1940-1943 with first quarter of 1944; there is also another table showing chlorine consumption in all Germany by end use for the same period of time with an estimate for the last quarter of 1945.

In addition, construction drawings of the 14 meter cell are included to guide in the construction of a similar plant. Several of the accompaniments to this report are available as separate PB documents; these may be listed as follows: Figures 1-8 as PB 44198, figure 10 as PB 41112 (reproduced more clearly in the former than the latter), figure 13 as PB 41104, figure 14 as PB 41105, and figures 16 a-b as PB 41130. Also reproduced in this document is "M.C." or Miscellaneous Chemicals Drawing 136 being "Drawings of the slope of the 'Fiele', cell, pump and end castings."

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 803

UNCLASSIFIED

KYANITE AND SYNTHETIC SILLIMANITE IN GERMANY. Reported by: G. W. Josephson. 11p.

The object of this investigation was to learn what progress had been made in Germany in replacing Indian kyanite for refractory manufacture, with domestic substitutes of synthetic or natural origin. One company had fair success in producing an artificial "sillimanite"; although expensive, the degree of success of this method is of interest to countries which do not possess ample supplies of natural mullite-forming minerals. This paper describes production methods and composition of artificial "sillimanite" at the Heinrich Koppers G.m.b.H. in Duesseldorf, research carried out at the Dr. Carl Otto G.m.b.H. at Bochum, and an investigation by the Kaiser Wilhelm Institut fuer Silikatforschung, Berlin-Dahlem, of kyanite deposits in southern Austria. A translation of the latter document is enclosed. The deposits found appear to be promising; complete data as to extent and possibility of commercial exploitation are lacking.

Item No. 22

FIAT REPORT NO. 804

UNCLASSIFIED

MOLYBDATE ORANGE PIGMENT. Reported by: F. H. McBerty. 16p. This document reports on visits to the I. G. Farbenindustrie plants at Gensdorf, Gersthofen, and Verdingen. The development of the "mixed crystal" pigments, the molybdate reds or oranges, and the process of manufacture at Verdingen used in the early war years are described. These pigments consist of mixed crystals of lead chromate, sulfate and molybdate. They are characterized by exceptional strength and "blueness of tint," together with outstanding brilliance. As an exhibit there is attached a molybdate orange schematic equipment diagram. This typewritten carbon copy may not photograph well.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 806

UNCLASSIFIED

GESELLSCHAFT FUR LINDE'S EISMACHINEN(LINDE-FRANKL OXYGEN APPARATUS), HOLLREIGELSKREUTH. Reported by: C. G. Andrew. 14p.

The purpose of this investigation was to procure information concerning capacities, types and number of units installed, of the Linde-Frankl apparatus for the production of low priority oxygen. The investigator evaluates the usefulness of this type of apparatus and considers it quite suitable under the economic conditions prevailing in Europe. Four flow sheets are included and a list of the units installed, giving their location, capacity, ownership, and use of the oxygen produced.

Item No. 22

FIAT REPORT NO. 807

UNCLASSIFIED

LITHARGE AND RED LEAD PROCESS. Refer to Item No. 21 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 808

UNCLASSIFIED

CONTRIBUTION TO THE REGENERATION OF PICKLING SOLUTIONS.

Reported by: E. R. Thews. 6p.

The effect of accumulations of ferrous sulfate and chloride in pickling solutions is discussed, and methods of prolonging the usefulness of such solutions are given, including four methods of regeneration. Table 1 indicates the influence of the ferrous sulfate contents of the liquor on the degree of solubility at normal and elevated temperatures. Edmund R. Thews is a German consulting engineer and this report contains a biography of him.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 809

UNCLASSIFIED

FERROCYANIDES AND SULFUR FROM GAS WORK RESIDUES. Reported by:
F. H. McBerty. 13p.

An investigation was made of the Chemische Fabrik Wesseling A.G. process by which is obtained potassium ferrocyanide from spent oxides from gas works. Potassium ferrocyanide for making Prussian blues is made by way of the calcium salt and the insoluble calcium-potassium salt. The former is leached from gas works spent oxides after mixing with lime. The sulfur content of the spent oxides is first extracted with carbon disulfide. Both operations are described. The report also describes the method of analysis of the spent oxide as an aid to extraction.

Item No. 22

FIAT REPORT NO. 810

UNCLASSIFIED

ACTIVATED CLAY BLEACHING ABSORBENTS. Reported by: A. D. Rich
23p.

This report describes the history of the industry and the present production possibilities. In 1941 S&W-Chemie A. G. of Munich, with plants at Deggendorf, Heufeld and Moosburg, manufactured 75 percent of Germany's activated clay. Mining operations and processing of the following products by this firm are described: Tonsil Standard, the only contact type of activated bleaching adsorbent produced at present; Teg, alumina recovered in the manufacture of activated adsorbents, and used as a filler in the manufacture of rubber; Granosil, a percolation type of activated bleaching adsorbent used in the refining of petroleum oil; and Tixoton, an artificial swelling type bentonite, used for molding sand in foundries and in crude oil drilling. Map of S&W-Chemie mines, plant layouts and lists of equipment are included.

Item No. 22

FIAT REPORT NO. 811

UNCLASSIFIED

CHROME YELLOW AND OTHER PIGMENTS AT G. SIEGLE AND COMPANY.
Reported by: F. H. McBerty. 12p.

Lead chromate and zinc chromate pigment formulas used by G. Siegle and Co. of Stuttgart are outlined, also formulas for two iron blues and for Siegle Red. Other information on the firm is also given.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 812

UNCLASSIFIED

THE ALUNA PROCESS. Reported by: G. A. Hinkel. 5p.
This report describes a method of making diazo types (osolid prints) by first photoprinting on a special transparent reproduction material called Aluna through either reflex copying or projection printing to obtain a negative. The negative is then converted to a positive to serve as a new intermediate original. This process makes it possible to obtain highly intensified reproductions of pencil drawings and old weak originals. To make the Aluna stock, the transparent paper is coated with a nitrocellulose lacquer on one side, dried, and a substratum superimposed on the lacquered surface. For Aluna Kontakt, a sensitized silver bromide is then applied. Aluna Kontakt T makes use of a silver chloride emulsion instead. Especially mentioned are Kalle & Co., A. G., and Felix Schöller Co. at Burg Gretsck, Osnabrück.

Item No. 22

FIAT REPORT NO. 813

UNCLASSIFIED

PHOTO-REPRODUCTION RESEARCH OF KALLE & CO., A.G. INDEX OF MICRO FILMED REPORTS. Refer to Item No. 9 for a complete listing of this report.

GERMAN PRODUCTION OF SOME OF THE MORE IMPORTANT INORGANIC PIGMENTS (WITH SUPPLEMENT NO. 1) Reported by: C. H. Love. 82p

This report is divided into sections dealing with iron oxide pigments, chromium oxide pigments, cadmium pigments, and miscellaneous pigments. The report describes the processes for iron oxides used at I. G. Uerdingen, Farbwerke Rasquin (Mülheim), Schroeder and Stadelmann (Oberlahnstein), Kali-Chemie (Berlin), and Chemische Fabrik Wesseling A. G., Wesseling. These oxides include the yellow, red, brown, and black. Most attention was fixed upon the I. G. pigments. Part 2 of the report describes the chromium oxide products of several I. G. plants (Bitterfeld, Uerdingen, and Leverkusen) and of Kali-Chemie, the process of the latter being similar to that of I. G. Bitterfeld. A study of the I. G. Uerdingen plant shows that this plant produces chromium hydrate by reduction of $\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$ with molasses and also as a result of the manufacture of sodium benzoate, using benzoic acid and sodium bichromate (the Bozel-Maletra process). The production of chromium oxide from these hydrates and by reduction of sodium bichromate with sulfur are also described. Part 3 of the report describes the production of cadmium pigments, including the sulfides, by I. G. Farben, G. Siegle and Co. and Kali-Chemie. I. G.'s products included CdCl_2 , cadmium orange, cadmium yellow, and cadmium sulfoselenide. A description of these products and a flowsheet is given. Part 4 of the report describes the production of miscellaneous pigments. These include (1) red iron oxide from iron pentacarbonyl, (2) the magnetic iron oxide pigment for the plastic tape of the magnetophone sound reproduction system, also available as a polishing range for optical work called "Polimag", (3) hydrated chromium oxide pigment, (4) zinc sulfide type luminescent pigments, and (5) Silcar (silicon carbide) pigment, produced by Elektroschmelzwerk, Kempton, Bavaria. In describing the various processes in this report, emphasis has been placed upon the chemical rather than the equipment details of the process. Where the equipment is unique, it is described in detail. The investigators were favorably impressed with several processes at I. G. plants: (1) Production of yellow and black iron oxide pigments in situ in the iron reduction of nitrobenzene to aniline; (2) production of chromium hydrate at pressures of 5,000 pounds per square inch; (3) purification of residues containing as little as 5% Cd for the manufacture of pure cadmium pigments; (5) a revolving plate furnace used both in the manufacture of chromium oxide and cadmium sulfoselenide pigments. Diagrams and flowsheets are included. The appendix lists personnel interviewed, targets visited, lists of samples evacuated, and bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 816

UNCLASSIFIED

HORIZONTAL MERCURY CHLORINE CELL, I. G. FARBENINDUSTRIE, A. G. Reported by: TIIC Chlorine Industry Team. 114p.

Mercury cells of horizontal design were used predominantly in the I. G. Farbenindustrie for the electrolytic production of chlorine and caustic soda of high purity and 50 to 70% strength. The cells vary in length from 7 to 14 meters and operate at from 14,000 to 24,000 amperes. The current density ranges from 2800 to 3400 amperes per square meter, the voltage from 4.5 to 5.0 volts. Current requirements for the production of one metric ton of chlorine are 3800 to 4000 KWh. This report, compiled by a chlorine team from TIIB, presents in text and numerous drawings the more recently used equipment and techniques of this highly developed German industry. Among the points covered are: cell design, operation and maintenance, preparation and purification of brine, purification and handling of the products, electrical installations and instrumentation, analytical methods and health measures. 33 illustrations are included, together with appendices covering plants investigated, relevant publications and a list of reproduced drawings

Item No. 22

FIAT REPORT NO. 817

UNCLASSIFIED

VERTICAL MERCURY CHLORINE CELLS, I. G. FARBENINDUSTRIE, A. G. Reported by: TIIC Chlorine Industry Team. 55p.

Development of a vertical mercury cell for the electrolysis of NaCl began in 1937 and commercial adoption took place in 1939. The advantages of such a design are low floor space requirements and high capacity. The cells now in use are designed for a normal load of 24,000 amperes at 4.5 volts, the current density being 1720 and 2400 amperes per square meter depending on the type of cell. Although several installations of the vertical type cells were made during the war, one of which was capable of producing 100 metric tons of chlorine daily, the design is still considered to be in the development stage. This report which is a sequence to FIAT final report No. 816, FB 33221, covers development, design and maintenance of vertical cells, together with all pertinent questions of plant operation.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 818

UNCLASSIFIED

USE OF SODIUM AMALGAM FOR REDUCTION OF NITROBENZENE AND OTHER ORGANIC COMPOUNDS AND PRODUCTION OF SODIUM HYDROSULFITE.

Reported by: W. C. Gardiner. 20p.

This report describes the process and equipment at Leverkusen for the reduction of nitrobenzene to azobenzene for the manufacture of benzidine. The installation has a daily capacity of 3,000 kg. of nitrobenzene and utilizes sodium amalgam produced in 20,000 amp. mercury chlorine cell. Reduction of the aqueous suspension of nitrobenzene is carried out in batches in a nickel reactor with simultaneous production of 50% NaOH. The equipment and the general method as described in detail in this report have also been utilized in the production of hydrazobenzene, sodium hydrosulfite, and other reduction processes.

Item No. 22

FIAT REPORT NO. 819

UNCLASSIFIED

METALLIC SODIUM FROM SODIUM AMALGAM AT GERSTHOFEN. Reported by: W. C. Gardiner. 21p.

A process is described for producing metallic sodium from sodium amalgam employing a 1,000 ampere cell having revolving anodic discs to pick up a thin film of sodium amalgam. Steel cathodes are used; the electrolyte is 53% NaOH, 28% NaBr, and 19% NaI. The sodium contains 0.5% to 1.0% mercury which is reduced to 0.01% by treatment with calcium at 380°C. A 16,000 ampere cell design is described and the process economics are discussed. The report reproduces three Miscellaneous Drawings: MC 289, Flowsheet for sodium cell, Gersthofen SK 3402; MC 290, Experimental sodium cell, capacity 1,000 amperes - SK 3723; MC 291; Drum-type sodium cell for 16,000 amperes, SK 4043.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 820

UNCLASSIFIED

DEGUSSA SODIUM PRODUCTION USING DOWNS CELLS. Reported by: W. C. Gardiner. 20p.

This report describes the design and operation of the Downs sodium cell as operated by Degussa. Pure dried NaCl is fed continuously to a 24,000 ampere cell with an electrolyte of 58% CaCl_2 and 42% NaCl_2 , operating at 585-595°C. The voltage is 7.8 to 8.0 with a current efficiency of 78%. The collected sodium is filtered to remove calcium. The labor, material, and power requirements are given. The design of a 32,000 ampere cell is also described. Diagrams of the 24,000 and 32,000 ampere cells, and of the sodium filter are included. Bibliography.

Item No. 22

FIAT REPORT NO. 822

UNCLASSIFIED

ELECTROLYTIC MERCURY OXIDE AT BURGHAUSEN. Reported by: W. C. Gardiner. 6p.

The report gives some details of the electrolytic process used at the plant of Dr. Alexander Wacker G.m.b.H. for producing a mercury oxide catalyst for acetaldehyde production. The plant consists of twelve cells, each of which can process 4.6 tons (metric) of mercury per month. Mercury is made the anode in an alkaline electrolyte. An oxide layer forms on the mercury surface and this is continuously skimmed off, along with some occluded mercury which falls to the sloping bottom of the cell. The cells operate at 1600-1800 amps. and 12-17 volts at 50-55°C. A diagram of the cells and a flow sheet are included.

Item No 22

FIAT REPORT NO. 823

UNCLASSIFIED

UTILIZATION OF BLAST FURNACE SLAG IN GERMANY. Refer to Item No. 21 for a complete listing of this report

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 824

UNCLASSIFIED

MISCELLANEOUS GLASS INDUSTRY OF CENTRAL EUROPE. Reported by: H. H. Blau and C. J. Uhrmann. 87p.

This report presents the results of an extensive study of the miscellaneous glass industry in the British, French and American occupied zones of Germany and Austria. It sets forth old secret or little known processes, as well as apparent new developments which are of potential value to American industry. It covers the following: Raw materials; glass compositions; batch mixing and material handling; fuels; melting furnaces and practices; glass forming practices and equipment; presses; lot end auxiliary equipment; annealing equipment; moulds; mould pasting; finishing processes and equipment; special processes, including Heraeus processes for quartz glasses, production of glass beads and jewels and sintered glass filters; special products, including glass blocks or bricks, battery jars, a new type of cooking vessel and Neonhan, a glass of relatively high neodymium content; research; and literature. Appended are lists of personnel interviewed, targets visited and documents, samples and microfilms transmitted to Washington, D. C; technical data on producer and coke oven gases; tables giving compositions of colored and other kinds of glass; and photographs and drawings of plants and equipment.

Item No. 22

FIAT REPORT NO. 825

UNCLASSIFIED

CHLORINE DIOXIDE AND SODIUM CHLORITE AT I. G. FARBEN, "GRIESHEIM. Reported by: W. C. Gardiner and E. H. Karr. 15p.

Two processes were developed for the production of NaClO_2 . In both cases, ClO_2 is generated by passing SO_2 and air through a mixture of NaClO_4 and H_2SO_4 . ClO_2 is absorbed either in NaOH and H_2O_2 or in zinc dust suspended in water, with subsequent reaction with NaOH . Two pilot plants, of 4 tons and 15 tons monthly capacity respectively, were in operation at the I. G. Farben plant at Griesheim. Construction of a 100 ton plant was contemplated. This report, which is a supplement to CWS report No. 10-5039 (PB No. 11199, see abstract in Vol. I p. 675 of this Bibliography) outlines the chemistry of the process, gives flow sheets, lists of equipment and instruments, analytical methods, safety measures and a cost analysis of the plant.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 885

UNCLASSIFIED

MANUFACTURE OF SYNTHETIC CAFFEINE. Reported by: V. L. King and R. P. Parker. 8p.

This report describes the production of synthetic caffeine at C.H. Boehringer and Soehne Ingelheim, by a method devised by Dr. C. Schewing of that firm. The report consists of a translation of the process description by Dr. Schewing and is supplemented with information obtained as a result of his interrogation. In spite of the many chemical reactions that take place, the process reportedly produces overall yields of 40-50% of caffeine based upon the cyanoacetic ester as the main raw material. However, since the cost of the synthetic product was about four to five times that of caffeine prepared from natural raw materials, such as theobromine and since the equipment was not very well suited for the process, no flow sheets and diagrams were secured. The appendix includes the list of German personnel interviewed, the list of samples evacuated to Washington, D. C., and a bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 830

UNCLASSIFIED

SODIUM IN GERMANY, AND THE RELATIONS BETWEEN I. G. AND DEGUSSA IN THIS FIELD. Reported by: Leon Schermack. 24p.

This report is a translation from the French regarding sodium production in Germany and the relations between I. G. and Degussa (Deutsch Gold- und Silber-Scheideanstalt) in this field. Two old processes (Castner and Downs) for making sodium are described. Two new processes are also described. One process produces a Pb/Na (lead/sodium) alloy by molten electrolysis. This alloy brought about the ethylation of lead as perfectly as the alloy, used until now, which is obtained by melting Pb and Na together. The presence of some potassium in the Pb/Na alloy increased the yields of tetraethyl lead 10 to 20%. The other new process is for the production of metallic sodium by electrolysis of a ternary eutectic mixture of 53% NaOH, 28% NaI and 19% NaBr. The report also discusses yields in tetraethyl lead manufacture.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 831

UNCLASSIFIED

SODIUM SULFATE ELECTROLYSIS WITH A MERCURY CATHODE. Reported by: William C. Garner. 29p.

Sodium sulfate, contaminated with organic matter, is a by-product of rayon manufacture. Its utilization through electrolytic production of NaOH and H_2SO_4 was investigated at the I. G. plant at Bitterfeld. This document contains a translation of a research report and the results of an interview with Dr. Hölmann, the chemist in charge of the project. His report may be translated "Sodium sulfate electrolysis with mercury cathodes" and is dated Aug 13, 1943. Among the methods investigated, the one employing a vertical-flow mercury cathode, a lead-silver anode, a microporous rubber diaphragm, and a current density of 1000 amps. per square meter is considered to be the most promising. The products are 50% NaOH and 250 g.p.l. H_2SO_4 containing 230 g.p.l. Na_2SO_4 . An outline of the work done and suggestions for further research are presented. Charts, drawings and photographs are reproduced. For FIAT reports 816 and 817 on the horizontal and vertical mercury chlorine cells, see PB 33221 and PB 33222, abstracted in this Bibliography, V.2, p. 784.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 832

UNCLASSIFIED

HYDROCHLORIC ACID ELECTROLYSIS AT WOLFEN. Reported by:
William C. Gardiner. 12p.

Hydrochloric acid, in this case a byproduct from an organic synthesis, is decomposed electrolytically into H_2 and Cl_2 . A series type cell, operating at 1000 amperes and 2.3 volts per unit cell, was developed at Bitterfeld, tested there and operated commercially in Wolpen. Bipolar graphite electrodes set in frames in horizontal press are used, with broken graphite pieces comprising the anode. The diaphragm is made of polyvinyl chloride cloth. Details, construction, operation and cost, together with a bibliography and several drawings were gathered by a chlorine team of TIIB and are presented in this report. A list of additional drawings on file with the Chemical Alliance, Woodward Bldg. Washington, D. C. is also included. These drawings will be made available by the Chemical Alliance soon.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 833

UNCLASSIFIED

EXPERIMENTAL PRODUCTION OF CHLORINE BY OXIDATION OF HYDROGEN CHLORIDE, I. G. FARBEN INDUSTRIE, OPPAU. Reported by: Kenneth C. Rule. 28p.

The pilot plant (at the I. G. Farbenindustrie plant in Oppau) for the production of chlorine by the oxidation of hydrogen chloride is described; this modified Deacon process was developed by Dr. Helmut Schlecht between 1939 and 1944. Estimated costs of construction and operation of a plant using this process are compared with those for a plant employing the method of electrolysis of hydrochloric acid, as used at the I. G. Farben works at Bitterfeld. These estimates indicate that for a large plant the oxidation process would probably have lower capital and operating costs than the electrolytic process. Flowsheets, drawings and diagrams are included. The simplified flowsheet shown in plate I, appendix 4 may be augmented by M.C. drawing No. 338 (PB 49724) which is a flowsheet for 50 M. tons Cl_2 daily by oxidation of HCl . For FIAT report on the chlorination process, see PB 7745, this Bibliography, v. 1, p. 570. For FIAT final report 832 on the electrolysis of aqueous hydrochloric acid, see PB 33219, v. 2, p. 864.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 834

UNCLASSIFIED

PRODUCTION OF CAUSTIC POTASH IN MERCURY CHLORINE CELLS, I. G. FARBENINDUSTRIE, A. G. - SOUTH BITTERFELD. Reported by: William C. Gardiner. 10p.

The purpose of this investigation was to determine the main differences in design and operation of mercury cells in the production of caustic potash liquor, as compared with that for the production of caustic soda. Potash has been made commercially in only one mercury cell plant in Germany. The operation is similar to NaCl electrolysis but is more critical with respect to brine purity, current density limitation of 2,400 amperes/m², and increased electrode spacing of approximately 2 mm. Current efficiency averages 93 percent, cell voltage 4.3 and hydrogen 1.8 percent. Cost data for the first quarter of 1945 are tabulated.

Item No. 22

FIAT REPORT NO. 835

UNCLASSIFIED

TECHNOLOGICAL STUDY OF THE WALL AND FLOOR TILE INDUSTRY IN GERMANY, AUSTRIA AND CZECHOSLOVAKIA. Reported by: Frank P. Lester. 24p.

This report gives an overall picture of the floor and wall tile industry in Germany, Austria and Czechoslovakia. Only one factory in each of these countries was visited but interviews with ceramic engineers, plant managers, and university research men gave quite conclusive information. This industry was not considered essential to the German war effort and consequently stood still during the war. As a result the industry as a whole does not compare favorably with the industry of the U. S. according to the report. Appendices contain lists of personnel interviewed, targets visited and equipment evacuated and photographs of equipment. In Germany and Austria the machinery and equipment are inferior to U. S. standards. Only large tunnel kilns are used. Analysis of clay found in Horni Briza, Czechoslovakia is given. In Austria and Germany inferior raw materials are used. The report also includes targets in the sanitary ware line and art and dinner ware. Compositions of body and glaze used by Steingutfabrik Schwarzwald, Hornberg, manufacturers of sanitary ware are given. Some prices are also given. This is a report of the U. S. Department of Commerce, Technical Industrial Intelligence Division.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 836

UNCLASSIFIED

THE PRODUCTION OF ACRYLONITRILE IN THE I. G. FARBENINDUSTRIE PLANTS AT LUDWIGSHAFEN, HULS, AND LEVERKUSEN. Reported by: R. L. Hasche and J. G. McNally. 20p.

This report contains information on the process used, plant equipment, quality of product and rate of production. Flow-sheets of the process are included, together with a diagram of the distillation unit at Leverkusen. Bibliography.

Item No. 22

FIAT REPORT NO. 838

UNCLASSIFIED

ELEMENTAL FLUORINE, I. G. FARBENINDUSTRIE - LEVERKUSEN. Reported by: Errol H. Karr. 28p.

At the Leverkusen plant of the I.G. Farbenindustrie, fluorine was successfully produced in electrolytic cells made out of "Elektron" metal, an alloy of magnesium. Best results were obtained when using graphite-free carbon anodes and "Elektron" metal cathodes. The cell capacities were 250 and 2000 amperes, operating at 11 to 13 volts. The electrolyte was $KF \cdot 2\frac{1}{2}HF$ which during electrolysis was maintained at temperatures in the range of 75° to 85°C. The fluorine from the cells was subjected to low temperatures, -78° and -183°C. respectively, followed by a heat treatment at 300°C. for completing the removal of impurities. The purified fluorine was liquefied at -191° to -194°C. and measured amounts were distilled into steel cylinders cooled by liquid nitrogen. At room temperature the pressure in the charged cylinders was 150 atmospheres. Photographs of the 250 and 2,000 amp. cells are included in the appendix. FIAT miscellaneous chemicals Drawing No. 224, showing details of the cell body of the 2,000 amp. fluorine cell, is available as PB 41137.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 840

UNCLASSIFIED

CALCULATION OF REGENERATORS FOR LINDE- FRANKL INSTALLATIONS AND OVERALL UTILITIES REQUIREMENTS FOR LINDE-FRANKL OXYGEN PRODUCING UNITS. Reported by: John Robell. 12p.

Information, description and methods of calculating the regenerators used in the Linde-Frankl installations are given, as well as overall utilities and space requirements for oxygen producing units. A diagram of cold accumulators and packing together with graphs are included. For prior report by H. M. Weir, on the subject of gas liquefaction and fractionation plants built by Linde, see PB 368, abstracted in Bibliography, v. 1, p. 11.

Item No. 22

FIAT REPORT NO. 843

UNCLASSIFIED

CHLORINATED HYDROCARBONS FROM ACETYLENE. Reported by: G. B. Carpenter. 72p.

Detailed information is presented on the production of chlorinated hydrocarbons from acetylene made by the two major manufacturing companies in Germany. The products covered are tetrachloroethane, trichloroethylene, pentachloroethane, perchloroethylene, hexachloroethane, cis and trans dichloroethylene, and vinyl chloride. The companies are I. G. Farbenindustrie A. G., and Alexander Wacker A.G. Flow sheets for the various processes are included. A list is given of equipment drawings of the Alexander Wacker A.G. which were forwarded to Washington. Also included is a description of pilot plant work on the conversion of ethylene dichloride to vinyl chloride. Graphs and a bibliography are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 845

UNCLASSIFIED

RESEARCH REPORTS ON BENZ CHLORIDE, XYLYLENECHLORIDE TRIETHANOLAMINE, TRIETHANOLAMINE FATTY ACIDS ESTERS, AND METHYLOLACETOPHENONE. Reported by: Rohland. 6p.

This report consists of translations of four I. G. Farbenindustrie documents already included in this Bibliography. The titles of the documents and their authors follow: (1) Benzyl chloride (toluene, α -chloro-), xylylene chloride, by Dr. Rohland (see PB 679, v. 1, p. 38); (2) preparation of triethanolamine from aqueous ammonia and ethylene oxide in presence of CO_2 , by Dr. Plötz, this process having been filed under patent application I 72335 IVc/12q (see PB 677, v. 1, p. 38); (3) investigation into the esterification products of triethanolamine with higher molecular fatty acids, by Dr. Plötz (see PB 678, v. 1, p. 38); (4) methylol acetophenone, by Dr. Schörnig (see PB 773, v. 1, p. 34).

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 846

UNCLASSIFIED

PRODUCTS FOR THE LEATHER INDUSTRY FROM ETHYLENE CHLORIDE AND XYLOL AND THROUGH THE SULFURIZATION OF XYLOL. Reported by: Sherlock Swann and N. M. Elias. 5p.

Manufacturing processes used at the Höchst plant of the I. G. Farbenindustrie are described for the production of the condensation products of xylol (xylene) and ethylene chloride (dichloro ethane); such products are those described by the terms Derminoloil H^o 1/142, Derminoloil H^o 1/143, and Derminoloilfat H^o 1/146. This document itself is a translation of a German report, dated at Höchst Feb. 10, 1943. The manufacture of Derminoloil H^o 1/142 is described. By combining H^o 1/142 with Igevin, a new product with an excellent water resisting quality, Derminoloil H^o 1/143, is obtained. A substitute for tallow for the greasing of leather, Derminolfat H^o 1/146, is obtained by mixing H^o 1/142 with a solid chlorinated paraffin containing 6% chlorine. The viscosity of the products can be altered by varying the proportion of xylene and dichloroethane. As these raw materials were not so readily available, the suggestion is made of the use of the sulfurization products of xylene, which are available from xylene and sulfur chloride. Also described are preparations for Depsodrin H^o 1/148, Derminoloil H^o 1/151 and Derminolfat H^o 1/153.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 847

UNCLASSIFIED

BUTADIENE CATALYSTS. Reported by: Knepper. 3p.

This is a translation of a German document regarding a catalyst for butadiene. A catalyst with a higher phosphoric acid content than that used during 1942 is suggested. It was not possible to determine by the usual tests the most suitable proportion between the sodium phosphate and phosphoric acid. Tables show the results of laboratory tests. The report is based upon work done at I. G. Huls.

Item No. 22

FIAT REPORT NO. 848

UNCLASSIFIED

THE INFLUENCE OF OXYGEN ON THE CHLORINATION OF METHANE.

Reported by: Sherlock Swann and N. M. Elias. 3p.

The report describes experiments showing the inhibitory effect of oxygen on the chlorination of methane. Tests for carbon deposition in chlorination ovens are also described. Addition of oxygen causes no carbon deposition. This report is a translation of certain German documents, selected by Sherlock Swann and N.M. Elias.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 849

UNCLASSIFIED

ENGLISH TRANSLATION OF DEVELOPING USES FOR THE DISTILLATION RESIDUES FROM BUTADIENE OBTAINED BY THE REPPE SYNTHESIS. Reported by: Krzikalla. 8p.

This report describes briefly the preparation and uses of several products obtained from the Reppe residues. The work was performed at I. G., Ludwigshafen. Butadiene resin (gasoline-soluble resin), Carboresin C. (drying oil), and Carboresin P. (Buna S softener) are prepared by condensation with a little sulfuric acid. Insulation medium T.R. (binding medium for camouflage colors) is prepared by blowing through air (Oppau). A solution medium and a C₁₀-alcohol which is suitable for the manufacture of softeners are prepared by hydrogenation of the distillates which are discharged during the manufacture of Butadiene resin or Carboresin C or P, or by the hydrogenation of the butadiene residues. This report appeared as Mimeographed report PB 911.

Item No. 22

FIAT REPORT NO. 850

UNCLASSIFIED

ENGLISH TRANSLATION OF THE PREPARATION OF MEPASIN - SULPHINATE AND MEPASIN - MERCAPTAN. Reported by: Wieseemann. 5p.

This is a translation of a German document. An account of the work done in the I. G. Central Rubber Laboratory is given in this report. The preparation of mepasin-sulfinate from Mersolat E (mepasin sulfochloride) is investigated. For the reduction of sulfochloride, zinc and sodium-amalgam are considered as reducing agents. Mepasin-mercaptan is formed by the reduction of the mepasin-sulfochloride in acid solution. The results are discussed and illustrated with six examples. The original German document will be made available later as PB 35135. This report also appeared as Mimeographed report PB 912.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 851

UNCLASSIFIED

ENGLISH TRANSLATION OF THE IGNITION OF CHLORANIL - ALKALI - HYDROXIDE MIXTURES BY WATER. Reported by: Marschall. 6p. This is a report on a series of investigations made at I.G. Farbenindustrie, by Dr. Marschall of Höchst, to clarify the reaction mechanism of the production of ignition compounds, ignitable by water. Chloranil mixed with sodium hydroxide is used. Chloranil derivatives and other substances are also investigated. A patent application was filed by I. G. for the production of the ignition compounds. This report appeared as Mimeographed Report FB 913.

Item No. 22

FIAT REPORT NO. 852

UNCLASSIFIED

N-CHLORO-AMIDES OF HIGHER MOLECULAR FATTY ACIDS AND THEIR CONVERSION PRODUCTS. Reported by: Jacobs. 6p. Chlorination of the C₁₅-C₁₇ compounds at I. G. Farbenindustrie, Höchst, is described. The N-chloro-compound is capable of the same conversion as the chloro-amides of the saturated fatty acids. With the reaction of ethylene imine on N-chloro-amides, emulsion for softening can be prepared, for use with textiles. Taurine and methyl taurine can be used in the conversion. This report is a translation of a German document.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 853

UNCLASSIFIED

REACTION OF CYCLIC VINYLACTAMS WITH PHENOLS. Reported by: M. Maier and Knikalla. 4p.

The report covers work done in the Main Laboratory, I. G. Farbenindustrie, Ludwigshafen. The reaction of phenols and aromatic hydroxy-compounds is of general utilization for phenols and cyclic N-vinylactam. A table presents the reaction temperatures for a group of phenol derivatives with N-vinylpyrrolidone and the melting points of the products formed. The report is an abstract of the procedure which was patented as O.Z. 14,712. This report appeared as Mimeographed report PB 908.

Item No. 22

FIAT REPORT NO. 855

UNCLASSIFIED

THE MANUFACTURE OF ACETALDEHYDE IN GERMANY. Reported by? W. E. Alexander. 29p.

This report reviews the processes used in Germany for manufacturing acetaldehyde by the hydration of acetylene. The variations in procedure and equipment for the various plants studied are discussed in order to report all information obtained. The H&Ls plant provided the most complete data on the ferric sulfate-promoted catalyst process; therefore the plant equipment description and operating procedure are presented in detail. A diagrammatic flow sheet of the H&Ls manufacturing facilities is presented along with sketches of equipment which are considered non-standard. The appendices include a list of plants visited, a list of the personnel interviewed and a bibliography.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 856

UNCLASSIFIED

MANUFACTURE OF POLYVINYL-ETHERS. Reported by: E. N. Rosenquist. 14p.

Detailed procedures are given for the preparation of commercially important polyvinylethers. The entire series of compounds are prepared by rather simple mass polymerization methods using acidic catalysts, particularly boron fluoride dehydrate in dioxane. The report covers the preparation of the solid polymers designated as Igevins M40, A50, J60, and JZR, and Bindemittel Li 10; the oily Igevins A25, J30, J20 and Densodrin NW; and the waxy and resinous polymers designated as Igevin Z, ZJ, Densodrin V, W, H, and I. G. Wax V. The solid products are used as thickeners, textile finishing agents, adhesives, plasticizers, and paints for masonry, the oils as shoe and leather impregnating agents.

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FIAT REPORT NO. 857

UNCLASSIFIED

PRODUCTION OF ACETIC ACID AT BURGHAUSEN AND KNAPSACK. II. CONCURRENT PRODUCTION OF ACETIC ACID AND ACETIC ANHYDRIDE AT KNAPSACK. Reported by: W. E. Alexander. 29p.

This report reviews continuous processes for oxidation of acetaldehyde to acetic acid. The targets visited included: Dr. Alexander Wacker Gesellschaft für Elektrochemische Industrie, G.m.b.H., Burghausen, and the A.G. für Stickstoffdünger, Knapsack, near Cologne. The report is divided into two sections in order to separate the straight acetic acid processes from the one which concurrently produces acetic acid and acetic anhydride. Part 2 describes processes with and without the use of ethyl cellulose as an entrainer. Detailed descriptions of the processes and equipment are presented along with diagrammatic flow sheets for the processes. No important advances were noted. The report lists a number of German and other patents relating to the processes. The appendix lists the plants visited, the personnel interviewed and also contains a bibliography.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 859

UNCLASSIFIED

I. CONTINUOUS CHILLING AND COOLING OF CALCIUM CARBIDE. II. ACETYLENE GENERATION BY DRY TYPE GENERATORS. III. PURIFICATION AND DRYING OF ACETYLENE FOR CHEMICAL USE. Reported by: W. E. Alexander. 29p.

Part 1 of the report describes the method used for continuously chilling and cooling calcium carbide. This method is unique and new. Part 2 describes two designs of dry type acetylene generators used in Germany. These generators are quite different from those known in the U.S.A., especially the vertical type unit. Part 3 gives detailed descriptions of various purification and drying processes for acetylene as used at the various plants. This includes the drying of

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FIAT REPORT NO. 860

UNCLASSIFIED

THE PRODUCTION OF MONOVINYLACETATE. Reported by: E. N. Rosenquist. 31p.

This report covers the production of mono-vinylacetate by the vapor phase catalytic process in which acetic acid is added to acetylene under the catalytic effect of zinc acetate on carbon. A comparison of the operating process employed by the I. G. Farben Höchst plant and the Wacker plant at Burghausen is made. The preparation of the activated carbon employed is also described. Flow sheets of the Burghausen process and of the Höchst distillation are given. A list of the equipment used in each process is also given. The appendices include a list of the German plants visited, of the German personnel interviewed and a bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 861

UNCLASSIFIED

PLASTICIZERS FOR POLYVINYL CHLORIDE. Reported by: A. F. Smith. 30p.

Shortages of certain basic chemicals in Germany prevented research in the field of plasticizers for polyvinyl chloride. The abundance of Fischer - Tropach acids, however, permitted the development of many plasticizers based on these materials. Tests revealed that the most usable plasticizers can be found among the esters. Usable ethers are much more difficult to find and the prospect of finding plasticizers among the ketones, alcohols, and pure hydrocarbons is almost negligible. The report describes the preparation of a large group of plasticizers known as "Palatinols". Three methods of preparation are described, the bisulfate process, circulation process and the vacuum process. Fig I shows the Ludwigs-hafen layout for the preparation of the "Palatinols". The report also gives the details of manufacture of individual plasticizers, including diamyl phthalate, dicyclo hexyphthalate, and the Plastomolls. Fig II outlines the Desavin (diphenoxydiethanolformal) plant at Leverkusen and Fig III the Plasticizer N (tetrachloronaphthalene) plant at Leverkusen. It was stressed that due to the difference in raw materials, manufacturing of many of these plasticizers will not be suitable for the U.S.

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FIAT REPORT NO. 862

UNCLASSIFIED

POLY-VINYL CHLORIDE PRODUCTION AT BURGHAUSEN & LUDWIGSHAFEN.
Reported by: Arthur F. Smith. 32p.

This report discusses polyvinyl chloride and vinyl chloride copolymer production. All of the output of polyvinyl chloride and the polyvinyl copolymers is manufactured by the emulsion process, except for one 300 ton per month plant at Burghausen. This is the Dr. Alexander Wacker plant, which uses a suspension polymerization process. The polyvinyl chloride products of this plant are known as vinnols, the various types with their K-values being listed in this document. The production of Igelit PCU (polyvinyl chloride) and Igelit MP (polyvinyl copolymers) at Ludwigshafen is described. The common organic catalyst for the polymers is benzoyl peroxide and the common inorganic catalyst is hydrogen peroxide. Flowsheets for the production of Igelit PCU, Igelit MP, and polyvinyl chloride at the Alexander Wacker plant are given. The K-value of PCU, K-value of a plasticized PCU, and the polymerization in the presence of 1% benzoyl peroxide are recorded graphically. Abbreviations are given of the standards used in the control tests, such as K-value or "Fikentscher number" which indicate the molecular weight of the polymer with a constant catalyst concentration; the M-value, although similar to the K-value is more effected by the concentration of high molecular weight long chains in the polymer; the Defo number, abbreviation for "Deformation" number, is a test to determine the polymer. Among the appendices is a flow-layout of vinnol-production, presented as FIAT MC 168. For production of monovinyl chloride, see FIAT Final Report 867 by E. N. Rosenquist, PB 44940. For drawings and flow sheets concerning production of acetylene and of Vinnol, see MC 165-167, 169, 171-172 (PB 52181-52176).

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FIAT REPORT NO. 863

UNCLASSIFIED

ACTIVATED-CARBON PRODUCTION AT I. G. FARBENINDUSTRIE, LEVERKUSEN. Reported by: Peter W. Sherwood. 10p.

The purpose of the investigation was to determine the methods of manufacture of the industrial activated charcoals produced at Leverkusen as well as their usefulness for the removal of light hydrocarbons from gases. The adsorption of C_2 hydrocarbons on SK-Kohle for the recovery of ethylene from coke-oven or cracking gases represents a process of considerable interest. SK-Kohle, produced at Premnitz, was a granulated variety of a medicinal coal of high retentivity. The properties of the other activated charcoals (Carboraffin, Supersorbon, and Bensorbon) are not unusual. Included in the appendices are a list of the personnel interviewed and isobars and isotherms for the adsorption of the lower hydrocarbons on SK-Kohle. Parts of this subject have been covered in FIAT Final Report No. 444, PB 6355, v. 1, p. 475, which report pays particular attention to the engineering aspects of the charcoal production.

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FIAT REPORT NO. 866

UNCLASSIFIED

THE MANUFACTURE OF LUVITHERM FILM. Reported by: Walter A. Klein and John A. Lunn. 39p.

Luvitherm is the name applied to unplasticized polyvinyl chloride film which is heat-treated and may or may not be oriented. The report covers the manufacture of the film starting with the polymer and describes the various steps in the process through the production of stretched or unstretched film. The importance of this film lies in the fact that it contains no plasticizer and therefore has no tendency to shrink in the temperature range where it is ordinarily used. Its application to magnetophone tape, as a packaging material (including linings for food cans) and for wire and cable insulation are important. Figure 1 is a schematic drawing of the stretching machine. Miscellaneous Chemicals or "M.C." Drawings 186-A-1 and 186-A-2 show the assembly of the calender and the end view of stretching-calendering assembly; M.C. 186-B, Sheet 1 (in two parts) shows the assembly of the Luvitherm stretching machine; M.C. 186-B, Sheet 2, shows the housing of the Luvitherm stretching machine. M.C. 186-B-1 and 186-B-2 show details of the heated roll and of the engraved stretching roll. The latter two drawings derive from the factory of Erwin Kampf at Bielstein-Mühlen. The others derive from the I. G. plant, Ludwigshafen.

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FIAT REPORT NO. 867

UNCLASSIFIED

THE PRODUCTION OF MONO-VINYL CHLORIDE. Reported by: E.N. Rosenquist. 18p.

This report describes the operating procedure for the catalytic production of monomeric vinyl chloride. At the Burghausen plant of Dr. Alexander Wacker, Gesellschaft für Elektrochemische Industrie G.m.b.H. anhydrous hydrogen chloride and dry acetylene are converted to vinyl chloride over a catalyst consisting of 30% barium chloride and 1% mercuric chloride on activated carbon. Conversion at 100-180°C. amounts to about 25% in a single pass. The converted gases are scrubbed with trichloroethylene to remove vinyl chloride. The gases are recycled and the vinyl chloride is recovered from the trichloroethylene by distillation at elevated pressure. Yields are about 96-97%. Two identical banks of converter and accessory equipment are installed but only one series of columns. Information regarding production of activated carbon for the catalyst was obtained from I. G. Leverkusen. The process has the advantage of long catalyst life with corresponding low mercury consumption. However, the process operates at a low conversion and a considerable amount of accessory equipment is required for the recovery of the product. Details of the preparation of the activated carbon which is used as the catalyst carrier and a list of the required equipment are given. A flow sheet of the Burghausen process and a diagram of the monovinyl chloride converter are included. The appendix also contains a list of the personnel interviewed and bibliography. For production of polyvinyl chloride, see FIAT Final Report 862 by A. F. Smith, PB 44674.

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FIAT REPORT NO. 870

UNCLASSIFIED

THE PRODUCTION OF STROFLEX FILM. Reported by: Walter A. Klein and John A. Lunn. 24p.

This report covers the production of oriented polystyrene film called "Styroflex" at the Norddeutsche See-Kabelwerke, Nordenham, starting with styrene polymer. It includes a description of the process, M.C. drawings 187 A through E, a description of the equipment, and a discussion of the properties and applications of Styroflex film. The appendices include a list of German personnel interviewed, an abstract of the German article "Zur Physik des Styroflex", by E. Horst Müller, and a bibliography.

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FIAT REPORT NO. 872

UNCLASSIFIED

THE I. G. HOECHST GLYCEROGEN PROCESS. Reported by: R. Max Goeppe, Jr. 51p.

The manufacture of glycerogen, a glycerol substitute consisting of glycols, glycerol, erythritol, hexitols and other unidentified compounds, at I.G. Hoechst, by the continuous hydrogenolysis of invert sugar, is described. A flow sheet, drawings of the special pressure release valves and separator, excerpts from operating log books, cost data, catalyst preparation, and data on the special steels used are included.

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FIAT REPORT NO. 873

UNCLASSIFIED

THE SELF-IGNITION OF MIXTURES OF HYDROCARBONS AND AIR SUBJECTED TO VERY SUDDEN ADIABATIC COMPRESSION. Reported by: Wilhelm Jost. 7p.

This German document is reproduced with tables and graphs. An English abstract is given as follows: "The present report describes investigations on the kinetics of oxidation and combustion of hydrocarbons carried on to explain the reactions causing 'engine knock.' The experiments consisted of the very sudden adiabatic compression of mixtures of heptane and air and disclose the occurrence of a chain reaction followed by a not clearly defined secondary reaction." A biographical note on the author accompanies the report.

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FIAT REPORT NO. 874

UNCLASSIFIED

MANUFACTURE OF ETHYLENE OXIDE VIA CHLOROHYDRINATION OF ETHYLENE. Reported by: R. Max Goeppe, Jr. 59p.

The manufacture of ethylene oxide as practiced in several German plants, via the chlorohydration of ethylene, is discussed. The basic starting materials are ethylene, chlorine, water, and lime. Flow sheets, process details and equipment drawings are presented, together with some operating, yield and economic data. The production (pilot-plant scale) of ethylene oxide by direct oxidation of ethylene is discussed in FIAT Final Report 875, PB 79607, by Vaughan and Goeppe.

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FIAT REPORT NO. 875

UNCLASSIFIED

PROPOSED ETHYLENE OXIDE MANUFACTURE VIA OXIDATION OF ETHYLENE AT ZWECKEL, NEAR GLADBECK. Reported by: William E. Vaughan and R. Max Goepf, Jr. 86p.

Although ethylene oxide was produced in huge tonnages in Germany during the war years (1939-1946), via chlorohydrination of ethylene followed by saponification of the 4-5% solution of the chlorohydrin with lime water, a pilot plant rated at 100 tons per month, based on the direct oxidation of ethylene over metallic silver was designed and well on the way towards completion in 1945. Although this plant was never completed, I.G. Farbenindustrie felt that the process was economically competitive with the common chlorohydrination method. This report presents flow sheets, design drawings, descriptions, and some economic data obtained from German chemists and engineers and, as such, should permit evaluation of the potentialities of this procedure.

Part B of this document consists of the original report from I.G. Ludwigshafen (in German) dated March 9, 1939, describing the process as well as comparing this direct oxidation process with the customary process. Original patent claims are included. The customary German process is described in FIAT Final Report 874, PB 80396, by R. Max Goepf, Jr., and others.

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FIAT REPORT NO. 881

UNCLASSIFIED

CONTRIBUTION TO THE PRODUCTION OF CAST NICKEL ANODES. Reported by: Edmund R. Thews. 17p.

This report gives conditions for casting pure nickel anodes to avoid passivity and discusses the effects of both injurious and beneficial impurities which may be present. The most deteriorating impurities are chromium, arsenic, zinc, and iron. Impurities such as graphite and silicon exhibit pronounced technical advantages. Requirements for attaining maximum results with sand-cast nickel anodes are specified. An appendix contains a bibliography of the literature from 1916 to 1942. The author is a German consulting engineer.

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FIAT REPORT NO. 882

UNCLASSIFIED

ANODES. Reported by: Edmund R. Thews. 35p.

This report, written by a German consulting engineer, discusses the composition and use of electrolytic anodes for copper, brass, nickel, chromium, zinc, cadmium, tin, lead, and gold anodes. Troubles caused by improper use of anodes are given and corrective measures suggested. The report is written more in the form of a treatise than an ordinary technical report and gives many literary references after each metal is discussed.

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FIAT REPORT NO. 883

UNCLASSIFIED

EFFECT OF METALLIC ADDITIONS AND IMPURITIES ON THE GALVANIZING PROPERTIES OF ZINC. Reported by: Edmund R. Thews. 26p. The success of zinc galvanizing processes is governed by a large number of factors based on principles which in their final origin have not all been entirely cleared up as yet, although practically all important questions relative to technical galvanizing operations have been answered satisfactorily. If the galvanizing process is applied to suitable brands and qualities of iron and steel products, employing standard zinc brands and approved galvanizing processes, important difficulties are to be expected only if one or the other important rule of operation has been disregarded. Some of the most important factors of influence are listed. The problems due to impurities in zinc used for hot galvanizing are discussed, along with analyses of the effects, beneficial or detrimental, of lead, iron, aluminum, tin, cadmium, antimony and arsenic. This is a comprehensive discussion of the subject which should be of interest to galvanizers.

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FIAT REPORT NO. 886

UNCLASSIFIED

MANUFACTURE OF MELAMINE. Reported by: V. L. King and R. P. Parker. 7p.

Details are given on the operating instructions, on the use of materials, and on important items of the cost of conversion of melamine which will permit manufacturing cost estimates to be made on the process employed. The information was obtained from I. G. Fechenkeim (Mainkur Works) which made melamine using dicyandiamide, isobutyl alcohol, liquid ammonia and NaOH. The personnel of the plant stated that should the production of melamine be resumed the processes used would most likely be that of a continuous laboratory process and a "no solvent", pilot plant process for which I. G. acquired licenses from the CIBA of Switzerland. Appendix 5 gives information on Henckel, G.m.b.H., Düsseldorf-Holthausen, the chief customer of I. G. Fachenheim. For related documents, mentioned in appendix 4, see MC 188 a-o, PB 52175 (in German). These consist of textual matter with diagrams and flowsheets. The information contained in MC 188 represents work performed by CIBA of Switzerland and not at the Mainkur plant.

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FIAT REPORT NO. 889

UNCLASSIFIED

UREA MANUFACTURE AT THE I. G. FARBENINDUSTRIE PLANT AT OPPAU.
Reported by: William L. E. Dewling and John Robell. 31p.

Full information on the manufacture of urea from ammonia and carbon dioxide is given. One of the main objectives of the investigation was to determine the manner in which the German industry was able to use lead or monel-lined equipment without the excessive corrosion experienced by American producers. In order to prevent this excessive corrosion in the high pressure reaction vessels; it was found necessary to remove all sulfur compounds and traces of oxygen from the carbon dioxide. The compressed CO_2 at 45°C . is first passed through an activated carbon tower in which sulfur is removed. As practically all sulfur in the CO_2 gas at Oppau is in the form of COS (carbonyl sulfide), "M Köhle" is used for the packing of the tower. In removing the sulfur it is necessary to inject into the activated carbon tower about 3.5 gms. of NH_3 per cubic meter of gas as well as sufficient air for an oxygen content slightly in excess of stoichiometric proportion with the sulfur content. For removing all traces of oxygen from the CO_2 gas, the Oppau plant adopted a technique developed by Norsk Hydro in Norway. The sulfur-free CO_2 gas is heated to $110^\circ\text{--}130^\circ\text{C}$. in an exchanger and then to $220^\circ\text{--}230^\circ\text{C}$. in a steam preheater. It enters a converter which contains a nickel-copper catalyst. The gas flows up through the catalyst charge and is then returned to the exchanger for preheating the incoming gas. It leaves the exchanger without any trace of O_2 and is liquified in a water cooler. Unconverted CO_2 or NH_3 gases may be returned to the process or used for the manufacture of other products. The report also describes the preparation of the activated carbon ("M Köhle") for sulfur removal and the copper-nickel catalyst for oxygen removal. Flow diagrams for the process, with and without recirculation of unconverted gases are shown. Diagrams of the process equipment are also shown, a detailed list explaining the function of each piece of equipment.

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FIAT REPORT NO. 888

UNCLASSIFIED

METHANOL SYNTHESIS AT I. G. FARBENINDUSTRIE PLANT AT OPPAU,
Reported by: J. Robell and W. L. E. Dewling. 22p.

The process employed at Oppau is similar to that used in the United States. However, certain process and design features incorporated in this plant and improvements made in newer I.G. plants built elsewhere in Germany, are considered to be of particular interest. The raw material used for methanol is a water gas of approximately the following composition: 52.5% H_2 , 41% CO , 5% CO_2 , and 1.5% N_2 . Sulfur is removed from this gas by passing it through activated carbon at low pressure. The gas is adjusted to the proper ratio of H_2 to CO , scrubbed with water to remove the CO_2 , and compressed about 260 atmospheres. A flow diagram describes the manner in which this gas is synthesized to methanol. The raw methanol leaving the synthesis loop has the following approximate composition: 1 to 2% $(CH_3)_2O$, 6 to 8% H_2O , 90% CH_3OH , and 0.8 to 1.0% higher alcohols and ketones. A synthesis loop with the new type converter has a normal capacity of 110 tons of raw methanol per day. Based on CO fed into the system, the yield is 72%; based on H_2 the yield is 62%. A description is given of the elaborate distillation for obtaining a product pure enough for formaldehyde manufacture. The report also describes two methods for the preparation of the zinc chromate catalysts and also the method for the preparation of the activated carbon used in removal of sulfur. Also included are the analytical methods employed. The appendix includes a list of the German personnel interviewed, bibliography, flow diagrams of the synthesis and distillation systems, and diagrams of the interchanger and synthetic converter.

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FIAT REPORT NO. 891

UNCLASSIFIED

DUXOCHROME PHOTO COLOR PRINTS. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 893

UNCLASSIFIED

INTRODUCTION TO TECHNICAL PHOTOGRAPHIC X-RAY. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 894

UNCLASSIFIED

ELECTROSTATIC HIGH VOLTAGE GENERATORS. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 896

UNCLASSIFIED

ALUDRINE SULFATE: MANUFACTURE AND PHARMACOLOGICAL PROPERTIES. Reported by: V. L. King and R. P. Parker. 19p.

This pharmaceutical is described as the sulfate of dihydroxy-phenyl ethanol isopropylamine, differing from adrenaline in that an isopropyl group is substituted on the nitrogen in place of the methyl group. It was manufactured by C. H. Boehringer Söhne to be dispensed as a general antasthmatic. The principles of its manufacture, the pharmacological properties, indications and dosage are discussed. Administration by inhalation and perlingually are claimed as more effective advantages than are found in adrenalin. Abstracts of clinical usage as found in German journals are given. Appendixes 1-4 give lists of German personnel interviewed, of targets visited, of samples and literature evacuated, and a bibliography.

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FIAT REPORT NO. 897

UNCLASSIFIED

WALL AND FLOOR TILE INDUSTRY IN GERMANY. Reported by: P. Mocsari. 15p.

This report describes in outline form the present situation of the wall and floor tile industry in Germany. The capacity of the industry, technical achievements, war damage, location of the factories in the four occupation zones, existence of cartels and trade agreements and general commercial prospects for the domestic and potential export trade were investigated. According to the report the German wall and tile industry cannot be expected to compete in world markets for the next five or ten years. Special data concerning individual factories were collected by visits to factories in the American and French Zone, by reports of other investigators and by information obtained from the Military Government for Germany and former officials of the dissolved German manufacturers' association. This is a report of the U. S. Department of Commerce, Technical Industrial Intelligence Division. For additional information on this subject see FIAT Final Report 835

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FIAT REPORT NO. 898

UNCLASSIFIED

REDOX SYSTEMS IN EMULSION CO-POLYMERIZATION OF BUTADIENE (75) AND STYRENE (25). Reported by: I. M. Kolthoff. 10p.

Part 1 of the report deals with systems containing oxygen as the oxidizing agent and part 2 deals with systems containing benzoyl peroxide as oxidizing agent. From a practical viewpoint the most desirable redox system is that which contains traces of oxygen. The amount of air dissolved in the aqueous phase is sufficient to yield rapid polymerization. The Leverkusen group of I. G. recommends mersolate as emulsifying agent and sulfinate as reducing agent. The best pH is at about 2.5 to 3. At 40° C. a conversion of 60 to 80% is obtained in one hour. Diproxid retards the recipe. Polymerizations with benzoyl peroxide instead of oxygen are undesirable. The residual peroxide is precipitated with the coagulated polymer and affects the heat breakdown of the rubber. The appendices include a list of the personnel interviewed (Höchst and Leverkusen) and bibliography.

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FIAT REPORT NO. 899

UNCLASSIFIED

UNIPOLAR IONISED AIR: APPARATUS AND APPLICATION. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 902

UNCLASSIFIED

THE PRODUCTION OF CRUDE AND PURIFIED STEROIDS IN GERMANY.

Reported by: D. R. McCullagh. 16p.

This report contains information concerning the success of German industry in finding substitutes and in promoting new sources for cholesterol. Procedures used for the following purposes are given: 1. The production of crude cholesterol from several sources, 2. The purification of cholesterol, and 3. The manufacture of stigmasterol from soyabean oil. By following the directions herein reported and the information to be found in FIAT report No. 996 (PB L 78668), it is possible to manufacture many of these steroids (perhydrocyclopentenophenanthrene derivatives) starting with soyabean oil, wool wax, or spinal cord.

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FIAT REPORT NO. 903

UNCLASSIFIED

COSMETIC, PERFUMERY AND SOAP FORMULAE. Reported by: S. A. Karas. 105p.

This report reviews the formulae used by several important German firms manufacturing soaps, perfumes and creams. The compounding of creams from various synthetic material is described. The compounding of well-known German perfumes and the use of German aromatic chemicals and natural oils can be found in the formulae. There are also several designs of apparatus, which show economy of space and labor.

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FIAT REPORT NO. 905 and Supplement No. 1

UNCLASSIFIED

DETERMINATION OF SUITABILITY OF PARAFFIN MIXTURES FOR CONVERSION TO FATTY ACIDS BY CATALYTIC OXIDATION. Reported by: H. S. Coith and F. O. Robitschek. 8p.

Since the successful carrying out of the catalytic oxidation of paraffins to fatty acids is so dependent upon the characteristics of the raw materials, small scale tests for evaluating proposed raw materials are important. A description of two such tests is given. By way of showing how the tests compare with the actual production procedure, the latter is briefly reviewed. One of the examples given was a paraffin mixture boiling between 320°C. and 450°C. (Fischer Tropsch Gatsch) using potassium permanganate as catalyst. This document is the result of a visit to the research laboratories of Henkel and Company in Düsseldorf, where research for the Deutsche Fettsäurewerke is carried out. Three plants converted paraffin to fatty acids by this method: The I. G. plants at Oppau and Heydebreck and the Deutsche Fettsäurewerke at Witten.

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FIAT REPORT NO. 910

UNCLASSIFIED

PRODUCTION OF PHARMACEUTICAL AND INDUSTRIAL ENZYMES IN SOUTHERN GERMANY. Reported by: W. M. Swangard. 38p.

Pharmaceutical enzymes and related substances have been produced in southern Germany, particularly by the firms of R&Hm and Haas of Darmstadt and the Luitpold Werke at Munich, which are reported upon here. Manufacturing processes of enzymes for pharmaceutical and industrial operation were obtained. Many of these agents are comparatively new, all of them are valuable assets in this particular field of chemistry. The source of some of them is unique, and the whole field warrants attention of the American industry, according to this report. Processing methods are described for the manufacture of the following enzymes: Protease, pectinase, pancreatic amylase, clauden, sanarthrit, telatuten and luxyme. Protease was produced from special strains of Aspergillus parasiticus for use in commercial preparations for the leather industry which sold under trade names: Burmus, Orepon and Arasym. Pectinase was produced from Aspergillus Wentii for use in the fruit industries. Pancreatic amylase called Degomma was prepared before the war from beef pancreas and used in the textile trade for destarching. It is stated that instructions for making were lost. Clauden a styptic substance from beef lung tissue was used for control of hemorrhage. Sanarthrit, a cartilaginous extract was used as an antiarthritic injectable substance (not proteinaceous). Telatuten was used for treatment of arteriosclerosis. Luxyme, a mixture of celluloses, amylases, proteases and esterases obtained from Aspergillus oryzae, was widely used in treatment of digestive disorders. Appendices present: (1) Personnel interviewed; (2) targets visited; (3) reference to a related report; (4) photographs, and diagrams showing the production of pharmaceutical and other enzymes; and (5) a translation of German pamphlets describing products used in tanning and laundry industries. The latter includes treatment of goat skins with Arasym 11 N2 plus Arapali, bating with sodium sulfate, bating of dehaired hides for chrome-top leather with Orepon and soaking of laundry in Enzymolin or Burmus.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 912

UNCLASSIFIED

THE MANUFACTURE OF BILE ACIDS FROM OX BILE. Reported by:
P. Dehaen. 13p.

This report describes the manufacturing methods used by Riedel deHaen A.G., Berlin, for the manufacture of cholic acid, desoxycholic acid, and dehydrocholic acid from ox bile. A list of the equipment required is given. The manufacturing methods described do not seem to differ essentially from those which are generally known. Certain details, however, may offer special advantages. Bibliography.

Item No. 22

FIAT REPORT NO. 913

UNCLASSIFIED

SYNTHETIC DETERGENT APPLICATIONS. Reported by: H. S. Coith and F. O. Robitschek. 7p.

Various synthetic detergents are listed by name and formulas given, with comments on their specific properties and the applications for which they are especially adapted. The report covers Cyclanon, Gardinol, Igepals, Igepons, Mersolat, Nekal, and Tylose. The appendix lists the personnel interviewed and plants visited and includes a bibliography.

Item No. 22

FIAT REPORT NO. 914

UNCLASSIFIED

THE MANUFACTURE OF BROMALLYLATED BARBITURATES. Reported by:
P. DeHaen. 19p.

This report describes the manufacturing methods used by the Riedel-de Haen A. G., Berlin-Britz, for the manufacture of the following bromallylated barbituric acids: Isopropyl-bromallyl barbituric acid ($C_{10}H_{13}O_3N_2 Br$); bromallyl-isopropyl-N-methyl barbituric acid ($C_{11}H_{15}Br O_3N_2$); sec. butyl-bromallyl barbituric acid ($C_{11}H_{15}O_3N_2 Br$); sec. amyl-bromallyl barbituric acid ($C_{12}H_{17}O_3N_2 Br$). The equipment that is required for the manufacture of these compounds is also listed in the report. The appendix lists the personnel interviewed.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 915

UNCLASSIFIED

MANUFACTURE OF SULFONAMIDES AND RELATED INTERMEDIATES IN THE FRENCH, BRITISH AND AMERICAN ZONES OF OCCUPATION, GERMANY.

Reported by: V. L. King and R. P. Parker. 86p.

The manufacture and technical development of the sulfonamides and closely related intermediates have been investigated in the French, British and American zones of occupation in Germany. The processes employed for production of these products are detailed within the present report. The individual sulfonamide compounds with their respective German names are listed below: 1-Sulfonamide-2',4'-diaminoazobenzene (Prontosil Rubrum, Prontosil Base); Sulfanilamide (Astrocid, Prontylamid, Prontablin, Chemodyn); N'-acetylsulfanilamide (Albucid); 4-(Aminomethyl)-benzene sulfonamide (Marfanil); Sulfapyridine (Eubasinum); Sulfathiazole (Eleudron); Sulfanilyl-2-amino-5-ethyl Thiodiazole (Globucid); Sulfamerazine (Methyl Debenal, Methyl Pyrimal); Sulfadiazine (Debenal, Pyrimal); and Sulfaguanidine (Resulfon). Appended to the report in Appendix 3 are the manufacturing processes which include, whenever possible, descriptions of equipment employed, conditions for reaction, methods of analytical control, materials, and important costs of conversion for 100 kilo of product. Also, appended to this report in Appendix 5 are included such drawings of equipment layout, flow diagrams and equipment construction as were available. The appendices which constitute the major portion of this document are in German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 916

UNCLASSIFIED

ENGLISH TRANSLATION OF STUDIES ON CO-POLYMERS AND INGREDIENTS FOR CO-POLYMERIZATION. Reported by: Wolz. 16p.

This document consists of translations of reports by members of the I. G. Farbenindustrie A. G. staff. The major portion of the document is from the Annual report for 1942 by Dr. Wolz, all eleven items of which have already appeared as PB 907, v. 1, p. 75, this Bibliography. Dr. Wolz's report covers the polymerization of butadiene, perbunan, several Buna compositions, polystyrene, and several other substances which have uses as copolymers or plasticizers. An investigation of latex was also made by the ultra centrifuge and the electronic microscope. A brief report by Becker on "High pressure polymerization," dated January 9, 1942, presents data which indicate that the results obtained with the high pressure autoclave for the copolymerization of butadiene and styrene do not equal expectations. Another report by Dr. Wieseemann entitled "Iron salts as degradation catalysts," January 31, 1945, gives data on preparation of iron salts to be used as degradation catalysts for rubber. These organic iron salts were suggested as substitutes for iron salts of paraffin fatty acids in the event of shortages of the fatty acids.

Item No. 22

FIAT REPORT NO. 917

UNCLASSIFIED

MANUFACTURE OF 2-ETHYL-ANTHRAQUINONE AT THE I. G. FARBENINDUSTRIE PLANT IN LUDWIGSHAFEN. Reported by: J. Robell. 14p.

A brief description is given of the process and equipment used. In the first step of the process, p - ethyl - benzoyl - o - benzoic acid is produced by adding at 35-40°C., phthalic anhydride to ethylbenzene in the presence of aluminum chloride, using an excess of monochlorobenzene as solvent. This is a Friedel-Crafts reaction. In the second step of the process, the p - ethyl - benzoyl - o - benzoic acid is reacted at 85-87°C. with concentrated sulfuric acid to effect ring closure, with the production of 2 - ethyl - anthraquinone. A yield of 90.3% of the theoretical is obtained in the first step and 75.3% in the second step. Flow sheets of both steps and a list of required equipment are also included in the report.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 919

UNCLASSIFIED

THE MANUFACTURE OF THE DIETHANOLAMINE SALT OF P-METHYLTOLYL CARBINOL-CAMPHORIC ACID ESTER AND A BRIEF EVALUATION OF ITS PHARMACOLOGIC PROPERTIES. Reported by: P. DeHaen. 6p.

This report describes a laboratory method for the manufacture of a new compound known as the diethanolamine salt of p-methyltolyl carbinol-camphoric acid ester ($C_{23}H_{37}O_6N$), which was marketed in Germany under the name of synthobilin. The effective ingredient of this water-soluble product is the oil-soluble p-methyltolyl carbinol. This product represents 5% of the essential oils of the crude drug from the Netherland Indies known as Curcuma domestica (temoe lawak). The synthetic water soluble product was prepared under German Patent No. 718951, dated July 14, 1937, and recent German Patent Applications No. C 56971 IVd/12o and No. C 57904 IVd/12o. The product has been found to produce an increase in the flow of bile. A brief review of pharmacologic studies carried out with this preparation is added.

Item No. 22

FIAT REPORT NO. 921

UNCLASSIFIED

MANUFACTURE AND PURIFICATION OF ARC ACETYLENE. Reported by: D. L. Fuller. 134p.

Hydrocarbon gases are partially converted to acetylene in an electric arc. The crude product gas is first purified by cyclone separators, bag filters, by oil, and finally by water scrubbing. The acetylenes present are then concentrated by solution in water under pressure. The higher acetylenes in this concentrate are then separated from acetylene itself by cooling in stages to -78° C. and the acetylene free gas is separated into its components in a Linde plant. Bibliography, tables and flow sheets appear in the appendices.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 924

UNCLASSIFIED

INVESTIGATION OF PURE OXIDE CERAMIC MATERIALS INTENDED FOR HIGH TEMPERATURE AND HIGH STRESS APPLICATIONS. Reported by: F. O. Hess. 26p.

The German technique and practices in the field of manufacture and application of pure oxide ceramic materials for high temperature and high stress applications is reviewed, i.e. Al_2O_3 , MgO , BeO , and some special bodies, such as SiC . A table lists the properties of five sintered refractory oxides. The appendix contains a translation of a report on the high-temperature stability of silica-carbide bodies for gas-turbine blades by Gerbard Müller of Staatliche Porzellan-Manufaktur, Berlin. The appendix also contains the patent (in German with English translation) of that Company with regard to a process for the production of gas-proof glazed layers on equipment mainly containing silicon carbide. A drawing of a typical muffle furnace of Degussa and graphs showing the effect of temperature on the properties of sintered bodies are also included in the appendix, together with a bibliography.

Item No. 22

FIAT REPORT NO. 925

UNCLASSIFIED

FORMAMIDE PRODUCTION AT THE I. G. FARBENINDUSTRIE PLANT AT OPPAU. Reported by: W. L. E. Dewling. 13p.

Formamide is produced at Oppau by the interaction of methanol, carbon monoxide, and ammonia in a batch process. Methanol and carbon monoxide are reacted in the presence of a catalyst to form methyl formate. The methyl formate is then reacted with liquid or gaseous ammonia to produce formamide as follows:



The methanol and unreacted ammonia are recovered and returned to the system. The sodium methylate catalyst used for the methyl formate system is made by adding metallic sodium to methanol. The recovery of the methyl formate from the first step is described. It is claimed that 82% of the methanol fed to the methyl formate autoclave is converted to methyl formate, and that about 98% of the methyl formate converted to formamide. The report also includes a flow diagram of the process, description of equipment based on information given by Dr. M. Günter, and bibliography.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 926

UNCLASSIFIED

MANUFACTURE OF BUTYNE-1,3-DIOL (AND CERTAIN RELATED MATERIALS) FROM ACETYLENE AND FORMALDEHYDE. Reported by: D. L.

Fuller. 59p.

Many details on the plant manufacture of butynediol and butenediol and on the laboratory work on butenediol and propargyl alcohol are discussed, that have not appeared in earlier reports. In this report considerable attention has been given to the handling of the butynediol catalyst.

Item No. 22

FIAT REPORT NO. 929

UNCLASSIFIED

EFFLUENT TREATMENT PRACTICES IN SOME OF THE CHEMICAL FACTORIES IN THE FRENCH, BRITISH AND AMERICAN ZONES OF OCCUPATION IN GERMANY. Reported by: V. L. King and R. P. Parker. 39p.

This report covers observations on the practices employed in those plants visited in the French, British and American zones of occupation. These include the plants of the "I. G. Farbenindustrie" on the Rhine, on the Main and as well other plants located in the western part of Germany. No comprehensive treatment processes for the wastes from chemical factories were encountered. Although the subject of effluent treatment was recognized as of prime importance, dependence was placed chiefly upon dilution in the receiving waters, and upon cordial relations with the various authorities responsible for the water system concerned. The I.G. plants considered include those at Ludwigshafen, Wolfen, Auschwitz, Offenbach, Mainkur, Uerdingen, Leverkusen, Höchst, Elberfeld, and Griesheim. The other plants include: E. Merck & Co., Darmstadt; Boehringer und Söhne, Ingelheim; Nordmark Werke, Uertersen, Grosser Sand; E. Schering, Müllerstrasse, Berlin; and Riedel de Haen, Seelze. The appendices include the following: Bibliography of reports in Document Center, Höchst, including Microfilm A26 (now in Washington); abstracts of reports listed in bibliography (abstracts in English); titles of reports on boiler feed water purification located in Griesheim Documents Center and to be found in Microfilm 108AA (now in Washington); charts and maps; and a special report (in German) prepared by Dr. H. Wurtschmitt of Ludwigshafen on "The treatment of the effluent question in the plants of the I. G. Farbenindustrie A.G."

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Item No. 22

FIAT REPORT NO. 933

UNCLASSIFIED

REACTION OF CARBON MONOXIDE WITH ACETYLENE, ALCOHOLS, CYCLIC ETHERS, TO PRODUCE ALIPHATIC SATURATED AND UNSATURATED ACIDS AND ESTERS. Reported by: G. B. Carpenter. 16p.

This report covers the research and development work on the reaction of carbon monoxide with a number of organic unsaturated hydrocarbons, alcohols, and ethers to produce acids and esters. Most of the work was done at the research laboratory of I. G. Farbenindustrie A. G. at Ludwigshafen from 1939-1944.

Item No. 22

FIAT REPORT NO. 935

UNCLASSIFIED

THE PRODUCTION OF HIGHER VINYL ESTERS AT LUDWIGSHAFEN.

Reported by: G. B. Carpenter. 9p.

This report describes the methods used by I. G., Ludwigshafen, for the production of vinyl esters of higher molecular weight organic acids (both aliphatic and aromatic) by reaction with acetylene. A batch autoclave process was first used and later a continuous liquid phase process was developed for the vinyl ester of tall oil acid and a vapor phase process was developed for vinyl benzoate.

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FIAT REPORT NO. 936

UNCLASSIFIED

PREPARATION OF HIGHER VINYL ETHERS AT LUDWIGSHAFEN.

Reported by: G. B. Carpenter. 11p.

This report covers the semicommercial and laboratory methods for the production at Ludwigshafen, of vinyl ethers of high molecular weight alcohols by reaction with acetylene. A method for the preparation of vinyl ethers of hydroxy esters is described. The laboratory work on the preparation of the vinyl ether of sugars is described

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FIAT REPORT NO. 937

UNCLASSIFIED

SPINNING, AFTER-TREATMENT AND AUXILIARY EQUIPMENT FOR STAPLE FIBER VISCOSE RAYON PLANTS IN GERMANY. Reported by: O.

V. Kohorn and J. L. Costa. 174p.

Staple fiber plants and machine manufacturers in British, French and American occupational zones were investigated and the latest types of spinning, after-treatment, cutting and drying machines in use are described and illustrated through assembly and cross-section drawings and photographs. Available detail drawings are listed. A section on utility and raw material consumption in production, and one on carbon bisulfide recovery systems are included. Continuous sodium sulfate crystallizers are briefly described. Photographs and diagrams are included.

Item No. 22

FIAT REPORT NO. 940

UNCLASSIFIED

THE MANUFACTURE OF NICOTINAMIDE AND RELATED INTERMEDIATES IN THE FRENCH, BRITISH AND AMERICAN ZONES OF OCCUPATION IN GERMANY. Reported by: V. L. King and R. P. Parker. 38p.

Detailed information, partly in German, on the manufacturing processes of nicotinamide and intermediates in Occupied West Germany, permitting reproduction and comparative evaluation, is given. The companies now in operation make the product by oxidation of synthetic quinoline, or hydroxy-quinoline to quinolinic acid by its decarboxylation to nicotinic acid, by esterification of this acid and amidation of the ester. A comparison of the principles employed by the following companies is presented: Bigot & Schürfe, Hamburg; I.G. Farben, Ludwigshafen; Vanillin Fabrik (formerly Riedel de Haën Werk), Hamburg; Riedel de Haën, Seelze, Hannover; I.G. Farben, Wuppertal-Klberfeld; E. Merck & Co., Darmstadt; and Nordmark Werke, Uertersen, Grosser Sand, Schleswig-Holstein. Appendices present: (1) Personnel interviewed; (2) targets visited; (3) bibliography; and (4) detailed description of the various processes used by the different companies.

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FIAT REPORT NO. 941

UNCLASSIFIED

THE QUANTUM YIELD IN THE ISOMERIZATION OF CROCETINDIMETHYL-LESTER BY LIGHT. Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 943

UNCLASSIFIED

THE MANUFACTURE OF AGFA-COLOR MATERIAL. Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 944

UNCLASSIFIED

OPPANOL C. HIGH MOLECULAR WEIGHT POLYVINYL ISOBUTYL ETHER. Reported by: A. O. Zoss and D. L. Fuller. 5lp.

Manufacturing procedures are given for the pressure reaction between acetylene and isobutanol to form vinyl isobutyl ether, and for the low temperature, -38°C. , continuous polymerization of this material to Oppanol C. The properties and uses of the high molecular weight, rubberlike product are described. Flow sheets and other diagrams are included, together with a bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 945

UNCLASSIFIED

THE MANUFACTURE OF γ -BUTYROLACTONE AT I. G. FARBENINDUSTRIE A. G., LUDWIGSHAFEN. Reported by: A. O. Zoss and D. L. Fuller. 18p.

The vapor phase manufacture of γ -butyrolactone at atmospheric pressure from butanediol-1,4, by use of a copper catalyst at 230-250°C. is described. Tetrahydrofuran, water and traces of impurities are removed by simple distillation at atmospheric pressure in cast iron apparatus. Pure butyrolactone is then obtained by vacuum distillation at a pressure of 2-20 mm Hg. A production of 40 metric tons per month was obtained. The report also describes an earlier vapor phase method which was found to be inferior. The preparation of the catalysts for both the liquid and the vapor phase is included, together with mention of the physical properties of pure γ -butyrolactone and the uses of the product. Flow sheets are included for the manufacture of γ -butyrolactone by the vapor and liquid phase methods and for the purification of the butyrolactone. Bibliography.

Item No. 22

FIAT REPORT NO. 946

UNCLASSIFIED

THE MANUFACTURE OF THIODIBUTYRIC ACID, AT I. G. FARBENINDUSTRIE A. G. LUDWIGSHAFEN. Reported by: A. O. Zoss and D. L. Fuller 13p.

The manufacturing process for the preparation of thiodibutyric acid from γ -butyrolactone and anhydrous sodium sulfide is described. The reaction occurs at 170° C. at atmospheric pressure and the disodium salt first formed is treated with sulfuric acid to provide the free acid. Labor, power and cost data are given, together with a flowsheet for the process. Some details are given for the preparation of the oxygen analogue from γ -butyrolactone and sodium hydroxide and for the disulfide from γ -butyrolactone and sodium disulfide. The formula for the oxidation of thiodibutyric acid to the sulfone is also given.

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Item No. 22

FIAT REPORT NO. 949

UNCLASSIFIED

ORGANIC CHEMICAL INTERMEDIATES FOR INSECTICIDES, FUNGICIDES AND RODENTICIDES. Reported by: J. T. Thurston. 44p.

This report deals with (1) insecticides, (2) fungicides, and (3) rodenticides with details on the preparation of the active ingredients contained in these products. In most instances the material, equipment and energies required for the various processes are given. The insecticides are Niro-sans, Tritox, Bladan, E605, and Lauseto New or S and Lucex powder. The fungicides are Brassecol and Tritisan, Brassi-son, Bulbosan, 2317W, and Ceresan. The rodenticides are Castrix or W491, Uracil, and Muritan or Promurit.

Item No. 22

FIAT REPORT NO. 950

UNCLASSIFIED

XYLENE-FORMALDEHYDE CONDENSATION PRODUCTS. Reported by: J. T. Thruston. 5p.

This report gives information on the preparation of Xylene-formaldehyde condensation products at I. G. Farbenindustrie, Leverkusen. These were sold under the trade names of Harze XF, Derminol81-2, and Corepale H, K, and W. The products are not satisfactory resins from the viewpoint of light fastness; however when used with products such as nitrocellulose, they are probably satisfactory.

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Item No. 22

FIAT REPORT NO. 952

UNCLASSIFIED

HIGH PRESSURE HYDROGENATION IN GERMANY. I. THE LIQUID PHASE. Reported by: P. W. Sherwood. 244p.

1. Hydrogenation, High pressure—Germany
2. Fuels—Hydrogenation—Germany 3. Coal—Hydrogenation—Germany 4. I.G. Farbenindustrie A. G., Ludwigshafen, Ger.

Item No. 22

FIAT REPORT NO. 957

UNCLASSIFIED

THE MANUFACTURE OF ALGINIC ACID DERIVATIVES AND THEIR USE AS EMULGATORS IN EMULSION "DISTEMPER" PAINTS. Reported by: W. G. Kunz. 5p.

The information contained in this report was obtained from Dr. Kurt Herberts & Co., Wuppertal, Germany. The report explains the circumstances leading to the development of emulsion paints based on alginic acid derivatives as emulgators, contains technical information as to the manufacture of alginic acid and its derivatives, and states the method of fabrication of Emulsifier "Hegoid-Z-10" and of emulsion ("distemper") paints made with it. Bibliography.

Item No. 22

FIAT REPORT NO. 960

UNCLASSIFIED

POLYETHYLENIMINE AND ITS USE IN PAPER MAKING. Reported by: J. T. Thurston. 5p.

This report gives some details of the process for making ethylenimine monomer and polymer, the polymer to be used in increasing the wet strength of paper. A previous report by Dahlen and Pingree on water resistance of textiles, described the preparation of the monomer and the intermediate product, β -chloroethylamine hydrochlorine which was converted to the monomer by treatment with aqueous sodium hydroxide. The present report describes the preparation of a more satisfactory intermediate product, β -aminoethyl hydrogen sulfate which is prepared by using sulfuric acid instead of thionyl chloride, as in the first intermediate. After treatment with sodium hydroxide, a yield of 85.5% of the theoretical amount of ethylenimine, 99.0% pure and boiling at 50-68°C., is obtained.

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Item No. 22

FIAT REPORT NO. 961

UNCLASSIFIED

PAPER AND TEXTILE MACHINE DESIGN, RELATING TO THE MANUFACTURE OF WADDING, FACIAL TISSUE, SANITARY NAPKINS AND THIN TISSUES. Reported by: E. Owen and C. G. Joa. 18p.

Of significance are experiments carried on during the last few years by the Paul Hartman Co. in Heidenkeim in the dry processing of cotton and cellulose fibers for the manufacture of wadding and absorbent tissues. A sketch of this machine and a sketch of a new German machine for loading knitted wrappers for sanitary napkins manufacture designed by Vereingte Papier Werke A.G. are included. At present the Hartman Co. is doing an excellent job of manufacturing wadding for sanitary purposes and tissues for milk filters by using cotton fibers on a Präge-Calander machine (photograph included) manufactured by Joh. Kleinewafers Söhne, Krefeld. The newest type of paper making machine for the manufacture of paper wadding and tissues is also described. This machine was built for laboratory purposes by J.M. Voith Co. and has several improvements over American design. Two sketches show details.

Item No. 22

FIAT REPORT NO. 962

UNCLASSIFIED

DETAILS OF MANUFACTURE OF TANIGANS EXTRA A, C AND F. Reported by: J. T. Thurston. 6p.

This report gives the manufacturing procedure, control tests and specifications for Tanigans Extra, A, C, and F, which are three of the principal synthetic tanning agents (syntans) made by I. G. Farbenindustrie A. G. at their Ludwigshafen, Leverkusen, and Höchst plants. Further general information may be found in the reports listed in the bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 963

UNCLASSIFIED

THE SYNTHESIS OF DIGITALOSE. Reported by: O. T. Schmidt and E. Wernicke. 8p.

The starting material was 4,5-metone-d-fucose-dibenzyl-mercaptal. It was transformed, by a known method, to 4,5-acetone-d-fucose-dimethyl-acetal. On reaction of the latter with one mol of sodium, the sodium was added in 2-position. The sodium compound reacted with benzyl chloride to form 2-benzyl-4,5-acetone-d-fucose-dimethyl-acetal. This compound was methylated with methane iodide and silver oxide. The product, when heated with methanolic hydrochloric acid, was transformed to 2-benzyl-3 methyl-methyl-d-fucoside. From this substance the benzyl group was split by hydrogenation, leading to 3-methyl-methyl-d-fucoside which may also be called methyl-digitaloside. Its hydrolysis with dilute acid produced 3-methyl-d-fucose which, the authors claim, is identical with digitalose. The development of the process is described. The experiment is described in detail, and the properties of all substances obtained are listed. A bibliography is added. The print contains a biographical note on the authors, in English. In German.

Item No. 22

FIAT REPORT NO. 964

UNCLASSIFIED

REGARDING THE RESISTANCE TO TEMPERATURE VARIATIONS OF ZYGOTES OF CHLAMYDOMANAS. (TEXT IN GERMAN). Reported by: F. Moewus. 8p.

Complete details of the technique used in experimenting with the zygotes are given. Two strains of Chlamydomonas eugametos were tested at temperatures varying from 45 - 85° C. Resistance paralleled the osmotic properties of the zygotes, the cells with greater osmotic properties being more resistant. Two genes condition the zygote resistance. The gene "zyte" rules the osmotic valves while the gene "zyme" modifies the strength of the osmotic membranes of the zygotes. Tables and bibliography are included. A biographical note of the author is included.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 965

UNCLASSIFIED

MANUFACTURE OF "PRESAL" ADHESIVE. Reported by: J. T. Thurston. 4p.

The report gives the manufacturing details for "Pressal," which is a melamine-formaldehyde adhesive extended with 70% of a specially hydrolysed potato starch.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 967

UNCLASSIFIED

POLYMERIZATION OF ACETYLENE TO CYCLOOCTATETRAENE. Reported by: K. Kammermeyer. 139p.

The polymerization of acetylene in solution of tetrahydrofuran over nickel salt catalysts was carried out primarily on a research scale. A limited amount of work was done in a continuous system using a fixed bed catalyst. The operating conditions were in the total pressure range of 15 to 25 atmospheres with nitrogen dilution and in the temperature range of 70 to 120° C. In general, a lower operating temperature was used when cyclooctatetraene was desired as the primary constituent and progressively higher temperatures were employed to obtain increased amounts of higher homologs and of azulene. The preparation of the catalyst and of the solvent, as well as the experimental procedure for batchwise operations are treated in considerable detail. Two diagrams show the arrangement for wetted catalyst and submerged catalyst operation. Theoretical considerations concerning possible reaction mechanisms and reactions of cyclooctatetraene and of higher homologs are presented together with a translation of a section from a manuscript on this subject by Dr. Walter Reppe and co-workers. A total of 17 patent applications were found to exist and are presented in abstract form together with the original German version. Safety considerations are discussed briefly. Drawings are shown of two experimental high-pressure autoclaves, one a vertical type and the other a horizontal inclined type. The possibilities of the utilization of cyclooctatetraene and its homologs are evident from the material presented regarding their reactions. The development and utilization of derivatives of the primary reaction products will depend entirely on the development of a more economical process (involving mainly the suppression of cuprene formation) than has heretofore been accomplished.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 968

UNCLASSIFIED

ALCOHOLS BY HYDRATION OF OLEFINS. Reported by: K. Kammermeyer and G. B. Carpenter. 38p.

Research and small scale semi-plant work on hydration of olefins, primarily of propylene, is presented. Catalyst preparation is described in detail. Plans for commercial development and the patent situation are discussed. The hydration of propylene over a fixed bed catalyst containing 20% of tungsten, as metal, and 5% of zinc oxide was carried through the development stage. The pressure used was 200 atmospheres and the temperature of operation was 220 to 250° C. It appears that conversions on a once-through basis were 50% and yields based on propylene were in excess of 95%. Solutions containing up to 20% of isopropyl alcohol (100% basis) were obtained. Insufficient experimental work was carried out to warrant conclusions in regard to hydration of ethylene and olefins higher than propylene. Two flowdiagrams and a diagram of a high pressure converter are presented. The report includes a patent claim (in German) by Dr. W. Reppe concerning this subject.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 969

UNCLASSIFIED

ACETYLENE GENERATION: DRY METHOD. Reported by: G. B. Carpenter and K. Kammermeyer. 42p.

This report describes the dry regeneration of acetylene from calcium carbide in horizontal rotating and in vertical type generators, as well as the subsequent purification of the gas. The rotary type of generator system used at Anorgana, Gendorf, and the vertical type of generator of the Alexander Wacker Werke, Burghausen, were studied in considerable detail, and are discussed with regard to carbide preparation, dry generation, lime processing, acetylene purification, and analytical control. Appendixes include a bibliography, drawings of both types of generators, and flow sheets.

Item No. 22

FIAT REPORT NO. 970

UNCLASSIFIED

METHODS OF STANDARDIZATION OF VAT DYE SUPRAPHIX PASTES AND POWDERS "FINE" MANUFACTURED BY I. G. FARBENINDUSTRIE A. G. HOCHST. Reported by: J. G. Kern. 31p.

Vat dye pastes are standardized at the Höchst plant of the I.G. Farbenindustrie A.G., by a thorough mixing of crude color press cake with assistants, followed by an adjustment to type strength and fine screening. If the wet dye paste is to be used for preparation of powders "fine" it is spray dried at low temperature. Grinding and mixing of powders "fine" is effected in conventional equipment with the incorporation of reduction materials into the finished product. Formulas for type vat dye pastes and powders "fine" as well as standard methods of testing these dyestuffs are included in this report. These formulas show in detail the composition of the finished products together with the identification of all assistants and reduction materials used in their standardization. Two flowcharts are included.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 972

UNCLASSIFIED

THE MANUFACTURE OF CHLOROBROMOMETHANE (FIRE EXTINGUISHING AGENT "CB") Reported by: B. Gluck. 10p.

This report gives details of the manufacture of this fire extinguishing agent at I. G. Höchst; as a fire extinguishing agent, it is used in conjunction with carbon dioxide and nitrogen. "CB" is formed by the action of bromine on methylene chloride in the presence of aluminum. To obtain good yields, it is advantageous to use an excess of methylene chloride and slightly more than the calculated amount of aluminum to make certain of no free bromine remaining after the reaction. A flowsheet and a list of required equipment are included in the report, together with composition and physical data, and requirements of raw materials, heat and power.

Item No. 22

FIAT REPORT NO. 973

UNCLASSIFIED

ENGLISH TRANSLATION OF SEVEN PAPERS ON DISTILLATION AND ABSORPTION EQUIPMENT DESIGN METHODS. Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 976

UNCLASSIFIED

THE AGFACOLOR PROCESS. Refer to Item No. 9 for a complete listing of this report.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 977

UNCLASSIFIED

COLOR REPRODUCTION BY COLOR PHOTOGRAPHY. Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 978

UNCLASSIFIED

THE SYNTHESIS OF ACRYLAMIDES AND THE COPOLYMERIZATION OF ACRYLAMIDES AND BUTADIENE. Reported by: M. Correll and W. Kern. 14p.

These two papers on production of acrylamides, and an copolymerization of butadienes with acrylamides, are translations of original reports, made in 1943, on work done in I. G. Farbenindustrie, Höchst.

Item No. 22

FIAT REPORT NO. 981

UNCLASSIFIED

THE DYEING OF GLASS FIBER TEXTILES. Reported by: G. M. Bloomfield. 8p.

This report describes a process for dyeing or sizing of glass fiber textiles made from glass staple fiber or continuous filament. All shades and tints of colors except deep black can be obtained, and the sizing process results in rendering glass fiber cloth water-repellent. The process consists in pretreating the glass cloth on a jigger with a dilute (0.3-0.5%) solution of sodium hydroxide containing Igepol C or a similar degreasing agent at about 60° C. The developer of the process was Rudolph Lang, once employed by the I. G. Farbenindustrie, A. G., at Reichenberg. Lang stated that Dr. H. Freitag of the Deutsche Glastechnische Gesellschaft, Frankfurt, had worked on the basis of Lang's method.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 982

UNCLASSIFIED

UTILIZATION OF COTTON IN GERMANY. Reported by: R. P. Dunn, Jr. 10p.

The purpose of this investigation was to determine what German developments had taken place during the war in the utilization of cotton, particularly lower grades, and to evaluate the production. In the utilization of lower grades of cotton no new machinery of consequence was reported as having been developed, and the only technique thought to be at all significant was the blending of cotton and flax (flockenbast). In general, processes employed were for the purpose of self-sufficiency and not for quality improvement. This report summarizes the practices followed by German cotton textile spinners, immediately preceding and during the war, in the utilization of cotton, and reports the German industries' evaluation of the products produced. It supplements FIAT Final Report No. 457, Nov 14, 1945, entitled "Factors relating to prospects for exporting U.S. cotton to Germany," by Robert C. Jackson, Joint Intelligence Objectives Agency (PB4495, v. 1, p. 333. Appendices present the following: (1) Personnel interviewed; (2) target visited; and (3) references to two related reports.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 983

UNCLASSIFIED

MANUFACTURE OF CHLORAL AT I. G. FARBENINDUSTRIE, A. G. LEVERKUSEN. Reported by: O. Grummitt. 15p.

This report describes the process and equipment for the manufacture of crude and purified chloral at I. G. Leverkusen. The process involves the chlorination of ethyl alcohol in two stages. The first stage is carried out continuously at 35-50°C. in all-glass apparatus and produces 30 liters per hour of partially oxidized and chlorinated product. The second stage is a batch process wherein 3000 liters of the initial product is chlorinated in a porcelain-lined reactor at 50-70°C. for 8-10 days to give a 50% yield of crude chloral which is 85% pure. A portion of the crude chloral is purified by the conventional process of sulfuric acid treatment and distillation from a glass-lined still pot without fractionation. The yield of pure chloral is 80% of the crude. A flow diagram and diagrams of the first and second stage chlorinators are included, together with a brief bibliography.

Item No. 22

FIAT REPORT NO. 984

UNCLASSIFIED

PHTHALIC ANHYDRIDE, MANUFACTURED BY I. G. FARBENINDUSTRIE, UERDINGEN. Reported by: O. J. Grummitt. 18p.

One of the four units for the manufacture of phthalic anhydride at I.G. Farbenindustrie A.G. Uerdingen has only recently been put into operation and is producing crude phthalic anhydride at the rate of 87 metric tons per month. The process, the vapor phase catalytic oxidation of naphthalene, and the equipment closely resemble that at the I.G. phthalic plants at Ludwigshafen and Schkopau. Operating conditions of feed rates, temperatures, and pressures are given in detail. Five figures show the flow-diagrams for the purification of naphthalene, the conversion of naphthalene to phthalic anhydride, the purification of the product, and the construction of the converter and naphthalene vaporizer. Bibliography.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

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FIAT REPORT NO. 985

UNCLASSIFIED

THE PRODUCTION OF AMMONIUM SULFATE FROM CALCIUM SULFATE AT OPPAU. Reported by: G. A. Cain. 7p.

A description is given of the plant process for the production of ammonium sulfate from calcium sulfate and ammonium carbonate. The equipment for carrying out the process is simple and consists essentially of grinding equipment for calcium sulfate (anhydrite), a series of reaction tanks, and filters for separating the ammonium sulfate solution. A schematic flow sheet is shown in Figure 1.

Item No. 22

FIAT REPORT NO. 986

UNCLASSIFIED

CARBON ELECTRODES IN GERMANY FOR THE ALUMINUM REDUCTION INDUSTRY. Refer to Item No. 22 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 988

UNCLASSIFIED

PRODUCTION OF ACETYLENE BY THE PARTIAL COMBUSTION OF METHANE. Reported by: A. S. Carter and G. A. Cain. 28p.

A description is given of the plant and process at I. G. Oppau for making a gas containing about eight percent acetylene by the partial combustion of preheated methane with oxygen in a specially designed burner. The plant operated at Oppau at a rate of 4000 cubic meters per hour of methane until the source of methane was destroyed by bombing three years ago. Engineering drawings and design and operating data are included in sufficient detail to permit construction and generation of the acetylene-producing unit. Concentration and purification of the acetylene stream remains to be developed.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 990

UNCLASSIFIED

PRODUCTION CYCLES FOR MANUFACTURE OF CELLULOSE ACETATE AND CELLULOSE PROPIONATE AT I. G. FARBENINDUSTRIE A. G., DORMAGEN. Reported by: J. S. Tinsley. 9p.

Cellulose acetate is produced using methylene chloride as solvent. The report describes the pretreatment of the cellulose (either linters or creped pulp), operating procedure, acetylation, hydrolysis, purification, and drying. Ordinary washing procedure is used for rayon grade cellulose acetate; for plastics or film additional acid treatment is required. Labor requirements for the process are given. Also described are the processes for the production of fibrous cellulose triacetate and cellulose propionate by the methylene chloride process. Cotton linters only were used for cellulose propionate due to the high viscosity required.

Item No. 22

FIAT REPORT NO. 994

UNCLASSIFIED

THE PURIFICATION OF SULPHUR WITH OLEUM. Reported by: G. A. Cain. 5p. Description of plant for purifying sulfur containing organic impurities by treatment with fuming sulphuric acid.

Item No. 22

FIAT REPORT NO. 998

UNCLASSIFIED

FLUROBENZENE MANUFACTURE. Reported by: F. O. Robitschek and B. H. Wilcoxon. 13p.

This report covers the detailed manufacturing procedure for the preparation of fluorobenzene by I. G. Farbenindustrie A. G., at Höchst. The plant was designed for twenty tons per month and was the only plant in Germany. Fluorobenzene was manufactured by diazotizing aniline hydrofluoride with sodium nitrite and hydrofluoric acid and subsequent decomposition of the diazonium salt. The product was used exclusively for the manufacture of the insecticide, Gix, an insecticide analogous to DDT using fluorobenzene in place of monochlorobenzene. A diagram of the Igelit ventilating device and a flowdiagram are included.

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FIAT REPORT NO. 999

UNCLASSIFIED

FORMALDEHYDE MANUFACTURE IN THE I. G. FARBENINDUSTRIE.

Reported by: R. H. Kriebel and J. B. Holmes. 15p.

Formaldehyde is manufactured in the Leverkusen, Ludwigshafen and Schkopau plants of I.G. Farbenindustrie A.G., by the catalytic dehydrogenation of methanol. An electrolytically refined silver catalyst is used. By this process 94 percent of the methanol reacts per pass leaving about 1.5 percent methanol in the final 30 percent solution of formaldehyde. No distillation of the final product is required. The yield of formaldehyde, based on methanol is 82.5 percent of theory. No heat is recovered from the converters at the Leverkusen plant, but at the Ludwigshafen plant sufficient heat is recovered in the form of low pressure steam to run the methanol evaporators. A flowsheet and a specifications sheet for methanol are included.

Item No. 22

FIAT REPORT NO. 1000

UNCLASSIFIED

THE OXO PROCESS. Reported by: M. M. Holm. 78p.

The Oxo process is a wartime development of the German firms of Ruhrchemie A. G. and I. G. Farbenindustrie A. G. It involves the addition of carbon monoxide and hydrogen to olefins to yield aldehydes and alcohols and is generally applicable with very few exceptions to all double bonds. The present report summarizes all phases of this development. It describes the various modifications of the process, as proposed by the various German workers in the field and furthermore includes information on those more or less new developments connected directly with the Oxo process or specific for Oxo products. A general description of the state of the art in Germany is presented and information required by the reader for his own evaluation is included. Since the report refers repeatedly to documents published in Technical Oil Mission (TOM) films a complete bibliography of these microfilms has been included. Also, various flow sheets, drawings, diagrams, sketches on wetting and foaming properties and on detergency of Oxo alcohol sulfate are attached.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1001 and Supplement No. 1 UNCLASSIFIED

THE SYNTHETIC STONE INDUSTRY OF GERMANY. Reported by: L. Merker. 28p.

This report reviews the manufacture of synthetic stones in Germany and developments in this field during the war years. The most significant of the advances were the development of a process for making jewel bearings from hardened synthetic spinel. The report also contains plant data concerning the manufacture of spinel and detailed formulae for the manufacture of synthetic spinels of various colors. To the present time synthetic spinels have never been manufactured in the United States. Five appendixes are included containing such information as: List of German personnel interviewed, targets visited, a bibliography, and drawings showing Verneuil Apparatus, furnace used by Wiedes Carbidwerk, and furnace used by I. G. Farbenindustrie A. G.

Item No. 22

FIAT REPORT NO. 1003 UNCLASSIFIED

THE CHEMICAL AND TECHNICAL BASIS FOR THE SYNTHESIS OF BUTADIENE AT I. G. LUDWIGSHAFEN. Reported by: G. Niemann. 31p.

This document consists of a lecture by Dr. Georg Niemann on May 12, 1944. In this lecture the author compares briefly, two butadiene processes based on acetylene: (1) via acetaldehyde by addition of water; and (2) via butynediol from reaction with formaldehyde. Flowsheets of the latter process, which was discovered by Dr. J. W. Peppe, are given. Mention is also made of numerous products that can be made from the main process intermediates and certain side products.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1004

UNCLASSIFIED

IDENTIFICATION OF BIOLOGICAL STAINS AND INDICATORS MANUFACTURED BY I. G. FARBENINDUSTRIE, A. G. Reported by: J. G. Kern. 27p.

The I. G. Farbenindustrie A. G., manufactures biological stains and indicators, the identity of which has been established with reference to the textile dyestuffs and organic chemicals from which they are prepared. The methods of testing these products for acceptance as standard stains and indicators have been determined. Pertinent data are presented in this report.

Item No. 22

FIAT REPORT NO. 1006

UNCLASSIFIED

AUSLOSUNG VON RONTGENMUTATIONEN BEI ARABIDOPSIS THALIANA (L) HEYNH. UND IHRE BEDEUTUNG FUR DIE PFLANZENZUCHTUNG UND EVOLUTIONSTHEORIE (X-RAY MUTATIONS IN ARABIDOPSIS THALIANA (L) HEYNH AND THEIR SIGNIFICANCE FOR PLANT BREEDING AND THE THEORY OF EVOLUTION). Reported by: E. Reinholz. 73p.

A large number of mutations of morphological and physiological nature were obtained by applying X-rays to the seeds of Arabidopsis thaliana which is especially suitable for genetic research. After having ascertained the spontaneous mutation rate, the most favorable germinating conditions, the ray sensitivity of soaked seed, and the F₁-deviations of nonhereditary character for the Enkheim strain, mutations resulting in F₂ were arranged according to their suitability for existence. It is of interest for the theory of evolution that mutations take place which are not restricted in vitality and show such differences in characteristics as are found in separate wild strains. Moreover, the significance of some mutants for the science of plant breeding is pointed out. Photographs, tables, and graphs are included together with an extensive bibliography. This document was submitted in 1945 as a doctor's thesis. In German. The document is issued by the Botanical Institute of the Johann Wolfgang Goethe University and Kaiser Wilhelm Institute for Biophysics, Frankfurt am Main.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1007

UNCLASSIFIED

SOURCES OF ERROR IN THE DETERMINATION OF SOIL REACTION AND CALCIUM REQUIREMENTS OF THE SOIL. Reported by: F. Toedt. 14p.

In testing the various methods of determining calcium requirements of the soil, only those methods were found accurate in which the soil sample is treated for a sufficient time and with sufficient intensity with either lime or a calcium salt such as the acetate. The pH value of such soil extracts permits direct reading, from tables, of the lime requirement of the soil in Kg/hectare. Use of a photoelectric colorimeter is considered essential for attainment of results of satisfactory accuracy, since it permits the use of lower indicator concentrations, thus reducing indicator-error. In German. The German title is: Fehlerquellen bei der Feststellung der Bodenreaktion und des Kalkbedarfs im Boden. The document originated in the Kaiser-Wilhelm-Institut für Physikalische Chemie, Berlin. There is a short biographical note of the author.

Item No.22

FIAT REPORT NO. 1008

UNCLASSIFIED

LOSSES DUE TO EVAPORATION AND MELTING OF THE ALPINE SNOW COVER PRIOR TO SPRING THAW. Reported by: O. Kirschmer and K. Rimkus. 7p.

This manuscript (in German) reports in detail on a series of observations using a new method of measuring snow evaporation, which lead to the surprising result that snow evaporation in the mountains is essentially zero. Observation of snowfall and diminution of snow cover over a period of several years led to the conclusion that the gradual reduction of the snow cover during winter is not due to evaporation but to continual melting of the bottom layers, since even at air temperatures of -30° C., the earth under the snow cover shows temperatures above 0° C. Consequently, the volume of mountain spring floods is not directly proportional to the total amount of winter snowfall. The experiments were intended as preparatory work for projected water power plants in the Alps. Tables and drawings included. Prof. Kirschmer has been head of the Research Institute for Water Power (Forschungsinstitut für Wasserbau und Wasserkraft) in Munich-Obernach since 1926.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1012

UNCLASSIFIED

SCREENING DEVICE FOR SLURRIES OF ORGANIC CHEMICALS. Reported by: J. G. Kern. 8p.

A high capacity screening device for slurries of organic chemicals has been developed at the Leverkusen plant, I. G. Farbenindustrie A.G., as an improvement on standard equipment manufactured by the Fischer A.G., at Nordhausen. A working drawing of this device is included in the report.

Item No. 22

FIAT REPORT NO. 1013

UNCLASSIFIED

DISPERSING AGENT SS, I. G. FARBEINDUSTRIE, A. G. HOCHST. Reported by: J. G. Kern. 5p.

This report presents the full details of the manufacturing process for Dispersing Agent SS at I.G. Höchst. The preparation has utility in either the paste or dry form. It is used as a dispersing agent for the manufacture of highly dispersible celanese and vat dyes, as well as for dyes for superpolyamides (Nylon 66) and other pigment dyestuffs. The exact chemical composition is not known. The product is obtained by condensation of cresol and formaldehyde (1st phase), and further condensed with 2-naphthol-6-sulfonic acid (2nd phase). Raw material specifications are also given.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1015

UNCLASSIFIED

OXIDATION OF HYDROGEN SULFIDE TO SULFUR IN CLAUS OVENS.

Reported by: G. A. Cain. 14p.

Several old type Claus ovens are described, as well as the newer type developed by I.G. Farben. Probably as a result of the necessity to treat large amounts of hydrogen sulfide removed in the purification of the gas for various synthetic fuel processes, I.G. Farben changed the oven considerably. Their modification consisted of the very obvious one of burning the hydrogen sulfide separately, and cooling the gas by using it to generate steam in a steam boiler. The gas was cooled to about 300° C, and then passed through the bauxite catalyst. This system permitted the generation of approximately two tons of steam for each ton of sulfur recovered. The capacity of the bauxite catalyst is also more than ten times as large as in the old type ovens. Additional information is needed in order to get a complete understanding of the process. Appendices present: (1) Personnel interviewed; (2) data from old type Claus plants; (3) information on the operation of the Claus plant at Gelsenberg Benzin A.G.; (4) information obtained from the Barmag-Megium A.G. on the Claus plant designed by them for the Deuben synthetic fuel plant; and (5) drawings of old type Claus ovens and H₂S combustion oven, Claus process, and flow diagram of Claus plant at Deuben.

Item No. 22

FIAT REPORT NO. 1016

UNCLASSIFIED

MISCELLANEOUS DYESTUFF INTERMEDIATES AT I. G. FARBENINDUSTRIE

A. G. LEVERKUSEN. Reported by: J. G. Kern. 53p.

This report gives full process detail at the Leverkusen plant of I. G. Farbenindustrie A. G., for the manufacture of 21 dyestuff intermediates. The intermediates discussed are derived from benzene, naphthalene, and anthraquinone. Full-scale processes are given for these intermediates. The German processes are given as an appendix to the report (in German).

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1017

UNCLASSIFIED

SOLID AND LIQUID ACETYLENE. Reported by: K. Kammermeyer. 11p.

The purpose of the investigation was to summarize available information on work carried out by the Material Prüfungsamt, Berlin, regarding the behavior of solid acetylene and the stabilization of fluid acetylene. Liquid acetylene, stable at atmospheric pressure, was prepared by dissolving seven to nine percent CO₂ in liquefied acetylene under about three atmospheres pressure. Chlorination experiments with liquid acetylene gave inconclusive results. A bibliography and extract of a FIAT report on "desensitization of liquid acetylene" are included.

Item No. 22

FIAT REPORT NO. 1018

UNCLASSIFIED

RUBBER VULCANIZATION ACCELERATORS PRODUCED BY I. G. FARBEN-INDUSTRIE A. G., HOCHST, ELBERFELD, LEVERKUSEN. Reported by: C. J. Major. 91p.

Process details have been obtained for the manufacture of 22 rubber vulcanization accelerators. These are designated by the German trade name "Vulkacit" followed by appropriate designations specific to the individual compounds. The following accelerators have been covered in this report:

Vulkacit AZ	Vulkacit F	Vulkacit 576
" BZ	" FP	" 576 Extra
" CA	" H	" 774
" CT	" I	" 1000
" CT-N	" M	
" D	" P	
" DM	" P extra N	
" DOTG	" Thiuram	
	" U	

Flow sheets appear in the text. Diagrams of apparatus are attached.

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FIAT REPORT NO. 1020

UNCLASSIFIED

"CAEDAX," A SYNTHETIC SUBSTITUTE FOR CANADA BALSAM IN
MICROSCOPIC TECHNIQUES. Reported by: J. G. Kern. 2p.

A permanent mounting material for microscopic specimens to take the place of Canada balsam was developed and manufactured at I. G. Leverkusen. "Caedax" is composed of the synthetic resin AW2 (a cyclohexane, formaldehyde resin), a material called AGO which is also called Clophen (a chlorinated diphenyl), and xylol. The exact proportions are given in the report.

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FIAT REPORT NO. 1019

UNCLASSIFIED

MAGNESIUM CARBIDE AND METHYLACETYLENE. Reported by: A. S. Carter. 8p.

Magnesium carbide of the Mg_2C_3 has been produced in several I.G. Farben laboratories. Hydrolysis of this product yields methylacetylene which has been carbonylated in conventional manner to produce methacrylic acid or its esters. Mg_2C_3 is prepared by double decomposition of magnesium chloride and calcium carbide in a fused salt mixture with critical temperature control. The process is little more than large laboratory scale. Appendices present: (1) Personnel interviewed; and (2) targets visited.

Item No. 22

FIAT REPORT NO. 1023

UNCLASSIFIED

MANUFACTURE OF ANTIPYRINE AND PYRAMIDON AT I. G. FARBEN-INDUSTRIE A. G. HOECHST. Reported by: J. G. Kern. 67p. Antipyrine and pyramidon have been manufactured in large volume at I. G. Farbenindustrie A. G., Höchst. The prior intermediates, phenylhydrazine and phenylmethylpyrazolon, were also manufactured at Höchst in neighboring buildings. Processes are presented for end products and intermediates. The plants are described briefly, and capacity analyses are given in some detail for antipyrine and pyramidon.

Item No. 22

FIAT REPORT NO. 1025

UNCLASSIFIED

PRODUCTION OF ACRYLONITRILE AT LEVERKUSEN. Reported by: A. S. Carter. 10p. This report supplements previous reports on the subject of acetylene manufacture by addition of hydrogen cyanide to acetylene. Several questions of technical operation have been amplified, particularly concerning reactor design and control, the composition of the feed gas stream, the ultimate disposition of byproducts and the purification of acrylonitrile.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1026

UNCLASSIFIED

RESEARCH DEVELOPMENT AT THE CONSORTIUM FUR ELEKTROCHEMISCHE INDUSTRIE GMBH, MUNICH, SINCE 1938. Reported by: K.

Kammermeyer. 22p.

A brief historical account is presented of the development of the Consortium and its contributions to acetylene chemistry. A total of 61 patent applications and patents applied for since about 1938 are given in abstract form.

These patents include preparations of vinyl esters, acetals and aldehydes and their derivatives, aldehyde resins, butadiene and butylenes, and methyl ethyl pyridine.

Item No. 22

FIAT REPORT NO. 1028

UNCLASSIFIED

RAPID PRODUCTION OF VISCOSE SPINNING SOLUTIONS AT ROTTWEIL.

Reported by: R. S. Bley. 7p.

This report reviews a process for the rapid production of matured viscose spinning solutions, developed by I. G. Farbenindustrie A.G., at Rottweil. The process is described in pending patent application I 67105 IV c/29b filed in the German Patent Office on Dec 10, 1942, and is based upon the controlled depolymerization of alkalice llulose by alkali metal sulfides, especially sodium sulfide. The process is said to give better results than hydrogen peroxide heretofore used in rayon, and apparently allows the preparation of matured viscose spinning solutions within a period of about six hours. Appendix 3 gives references to three related reports.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1029

UNCLASSIFIED

MANUFACTURE OF CRIMPED YARN. Reported by: R. S. Bley. 8p. This report covers the manufacture of crimped acetate yarn and staple fiber in accordance with the process disclosed in the pending patent application L 97803 IV c /29b. This application was filed in the German Patent Office on April 30, 1942, by Georg E. Rutishauser, assignor to Lonzona A.G., fuer Acetatprodukte. Cellulose acetate was used in the preparation of the spinning solutions. The crimped yarn and staple fibers cut therefrom were used during the war as a wool and fur substitute in coat linings. The process now abandoned was called "Wollin Verfahren". Diagram showing manufacture of crimped yarn is included.

Item No. 22

FIAT REPORT NO. 1033

UNCLASSIFIED

ON THE ARRANGEMENT OF THE DOUBLE BONDS IN HYDRINDENE, I. PREPARATION OF 5-ISOPROPYL-AZULENE. Reported by: H. Hippchen 9p.

Item No. 22

FIAT REPORT NO. 1032

UNCLASSIFIED

ON STRUCTURE IRREGULARITY OF THE SURFACE OF IONIC CRYSTALS. Reported by: I. N. Stranski and K. Moliere. 22p. Report written in two parts. Part I, changes in the crystal structure in the boundary surfaces of NaCl crystals are discussed which are considered due to a reduction of forces between the individual molecules. Part II, an attempt is made to calculate the structure of the boundary network surfaces of the Na Cl cube.

This paper presents an attempt to determine the location of the double bonds in hydrindene and its substituted products. The preparation of 5-isopropyl-azulene by the addition of diazo-acetic ester to hydrindene to form tetra-hydro-azulene-5-carboxylic ester is described. The ester thus obtained is then treated with methyl-magnesium iodide to form the corresponding carbinol which is subsequently dehydrated and dehydrogenated. In unsubstituted hydrindene the favored resonance form is probably the one contrary to the Mills-Nixon formula, whereas in substituted hydrindene one or the other form can prevail, depending on the substituent.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1037

UNCLASSIFIED

THE PREPARATION OF WOOL FOR CARDING AND COMBING. Reported by: J. A. Levering and W. A. Lofft. 13p.

The wollen mills visited were divided among the American, French and British Zones. Sorting practices and layout, and wool handling equipment were very good. Some of the German sorting rooms are excellently lighted and cleaned. A modern conveying system for unloading ships and delivering wool bales to warehouse and mill is described. In general the equipment used for opening, scouring and carbonizing and drying was not up to standards recognized in the United States. In the observation of wool grease recovery, the general practices were good as compared to methods used in the United States. Maintenance practices and power equipment were not above standards demanded in the United States. In Southern Germany mills were manufacturing blankets for the civilian trade, using mixtures of cotton, artificial fibers and cotton shoddy. In one or two instances, a small amount of scoured wool, up to about 10% was used in the blends. The mills at Hersfeld were making suitings and overcoatings, and in these two mills about 60% wool was being used. None of the mills in this group sustained any appreciable war damage, and as soon as supplies and fuel are available, could resume full production. Visits were also made to a rayon plant, the Zellwolle Lehrspinnerei at Denkendorf, and to the Deutscher Forschungsinstitut für textilindustrie at Reutlingen, to investigate equipment applicable to the control of wool processes, laboratory methods, or the testing of fibers. At both of these places the investigators found the testing equipment to be excellent, and believe that some of it could be adapted to wool research, particularly in the field of single fiber measurements. Appendices present: (1) Personnel interviewed; (2) targets visited; and (3) bibliography of related reports.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1039

UNCLASSIFIED

MANUFACTURE OF ISODECEHLPHENOL BY I. G. FARBENINDUSTRIE, A. G., UERDINGEN. Reported by: C. J. Major. 11p.
Isodecylene and phenol are reacted in the presence of zinc chloride and Tonsil clay at a temperature of 165 to 170° C. to produce crude p-isodecylphenol. The crude product is then distilled under vacuum for the separation of the final product from the unreacted olefin, phenol, and the higher boiling constituents. A flowdiagram is included. Isodecylphenol was used as a plasticizer for Igamid (Nylon).
Item No. 22

FIAT REPORT NO. 1040

UNCLASSIFIED

METHODS OF STANDARDIZATION OF VAT DYE POWDERS "FINE" AND CELANESE DYES AT I. G. FARBENINDUSTRIE, A. G., LUDWIGSHAFEN. Reported by: J. G. Kern. 45p.

Vat dye powders "Fine" and Celanese dyes are standardized at the Ludwigshafen plant of the I.G. Farbenindustrie A.G., by two different methods. One method is applied to those products that can only be dispersed with especially thorough mixing of dyestuff and assistants, and the other method is applied to those products that are readily dispersed and in all cases to those dyestuffs, principally azo celanese colors, which tend to ignite relatively readily. The first method, applied mainly to the standardization of vat dye powders "Fine", involves an initial mixing of dye press cake with dispersing agents. This is followed by a partial drying of the slurry, so obtained, on a drum dryer to form a cake containing about 10% water. This cake is then kneaded with water in a doughmixer to give a stiff paste containing 25% water. The paste is run over a 5-roll machine to give a thin flake. This flake is dried on a traveling screen dryer and ground and mixed to type strength in conventional equipment. The second method which is used mainly for celanese dyestuffs involves a slurring and wet grinding of press cake by circulation through a coarse screen and wet grinding mill until a product with satisfactory dispersion characteristics is obtained. The dispersed slurry is spray dried in a Krause dryer and finally mixed without grinding and reduced to type strength.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1041

UNCLASSIFIED

POLYSTYRENE MANUFACTURE AT THE I. G. FARBENINDUSTRIE PLANT AT SCHKOPAU. Reported by: R. H. Kriebel. 10p.
Styrene is polymerized at Schkopau by a batch emulsion process. The latex is coagulated with formic acid, filtered, compacted on an Aeroform press and dried on a tray filter. The properties of Polystyrene EF (Emulsion-Film) are listed in an appendix. This report supplements CIOS File XXVII-6, item 22, entitled "Manufacture of styrene and polystyrene," I. G. Farbenindustrie, Schkopau."

Item No. 22

FIAT REPORT NO. 1045

UNCLASSIFIED

THE MINING AND REFINING OF POTASH IN THE AMERICAN AND BRITISH ZONES OF GERMANY. Reported by: R. W. Mumford. 31p.
This report reviews typical practices employed in the mining and refining of potash salts and by-products as observed in the American and British occupied zones of Germany. The more meritorious innovations in practice and equipment are discussed as they apply to problems in: 1) mining; 2) refining of potash and associated salts; and basic products and by-products of the potash industry. Four Appendices include a list of German personnel interviewed, a list of targets visited, a bibliography, and three flow sheets.

Item No. 22

FIAT REPORT NO. 1046

UNCLASSIFIED

PRODUCTION OF CRUDE CITRIC ACID BY FERMENTATION IN GERMANY. Reported by: N. A. Davies. 8p.
This report summarizes the industrial technique employed in Germany during the war for the biological formation of citric acid from beet molasses. A suitable nutrient solution, rich in available sugar, is prepared and inoculated under aseptic conditions with a good strain of the acid-forming fungus, Aspergillus niger. The fermentation normally requires 10 days under controlled air conditions, and at the end of this period, the medium contains a substantial concentration of citric acid. The fermented liquor is removed and the acid recovered as calcium citrate. The calcium citrate is then converted to citric acid by a refining process which is very similar to that used in the production of tartaric acid.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1047

UNCLASSIFIED

MANUFACTURE OF INORGANIC MERCURY SALTS FROM PRIME VERGIN MERCURY AT CHEMISCHEFABRIK MARKTREDWITZ A. G., Reported by: M. H. McAllister. 5p.

A general description is given of the processes employed at this plant in the manufacture of mercuric chloride, mercurous chloride, yellow oxide of mercury, ammoniated mercury and red oxide of mercury. The processes as viewed in this factory were out of date in comparison with American practices.

Item No. 22

FIAT REPORT NO. 1048

UNCLASSIFIED

THE PRODUCTION OF ZIRCONIUM OXIDE. Reported by: M. H. McAllister. 7p.

Describes production of high purity zirconium oxide as practiced by the Oranienburg plant of Auergesellschaft A.G., using as raw materials both "favas" or natural zirconia and zircon sand or zirconium silicate. In the broad outline of the two processes, as described by the former plant manager of the Oranienburg plant, it is impossible to detect any new technique. As the plant is in the Russian zone a firsthand impression of the operations proved impossible. Appendix 3 gives references to two related reports.

Item No. 22

FIAT REPORT NO. 1049

UNCLASSIFIED

TARTARIC ACID PROCESSES IN GERMANY. Reported by: N. A. Davies. 14p.

The tartaric acid process of the leading producer in Germany is described. The process involves the following unit operations: Precipitation, decomposition, evaporation, brown crystallization, recovery of final brown liquor, purification, white crystallization, drying and packaging. Primary raw material has been lees. Argol and the intermediate material, calcium tartrate have also been employed. Flow sheets of process of Joh. A. Benckiser G.m.b.H. and C.H. Boehringer Sohn are included. Appendices present: (1) Personnel interviewed; (2) targets visited; (3) summary of materials of construction; and (4) references to two related reports.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1050

UNCLASSIFIED

CRUCIBLES FOR SYNTHETIC MICA DEVELOPMENT. Reported by: B. S. Ellefson. 19p.

This report summarizes the compositions, sizes and shapes of crucibles used in the development of synthetic mica in Germany. Detailed drawings are given which show the dimensions of the crucibles used. The method of manufacture and the composition of the special ceramic crucibles are described. A list of related reports is included.

Item No. 22

FIAT REPORT NO. 1051

UNCLASSIFIED

THE MANUFACTURE OF MONOCHLOROACETIC ACID FROM TRICHLOROETHYLENE AT I. G. FARBENINDUSTRIE, A. G., HOECHST AM MAIN GERMANY. Reported by: C. C. Kennedy and L. K. Frevel. 16p.

Monochloroacetic acid is produced at Hoechst by the continuous catalytic interaction of trichloroethylene and water, with yields of 91% of monochloroacetic acid, based on trichloroethylene, being obtained. The chief merit of the process is the purity of the final product; i.e., no dichloroacetic acid or trichloroacetic acid is produced. Balanced against this advantage is the serious corrosion problem encountered in handling highly corrosive hot liquids and vapors. A flowsheet of the plant and detail drawings of the reactor and cascade still are presented, together with the operating procedure.

Item No. 22

FIAT REPORT NO. 1052

UNCLASSIFIED

THE HIGH CURRENT CARBON ARC. Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 1053

UNCLASSIFIED

AERATION SYSTEM IN THE CONTINUOUS WALDHOF FOOD YEAST PROCESS. Reported by: F. Kiefer. 40p.

Technical details and blue prints of the aeration system and other phases of the Waldhof continuous yeast process, not previously available, are presented.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1057

UNCLASSIFIED

THE MANUFACTURE OF DEXTRINES AND COLD WATER DISPERSIBLE STARCHES IN GERMANY. Reported by: W. G. Kunze. 15p.
This report refers to the manufacture in Germany of adhesives derived from starch. It covers the fabrication processes of dextrines and cold water dispersible starches, the type of machinery used, and the compounding of the resulting products into industrial adhesives.
Item No. 22

FIAT REPORT NO. 1063

UNCLASSIFIED

ELEMENTS OF CLOUDS AND PRECIPITATION. Reported by: H. Weichmann. 44p.
This report consists of three parts. The first part deals with investigations into the micro-physics of the water droplet clouds. The second part contains micro-photographs of ice particles and new data on their origin and growth. The third part shows by actual case data how the elements of precipitation may change their form by falling through clouds. Appendix I contains ten diagrams and photographs, and Appendix II a bibliography. The text of the report is in German.
Item No. 22

FIAT REPORT NO. 1064

UNCLASSIFIED

RESEARCH ON ATMOSPHERIC MOVEMENTS BY USE OF GLIDERS. Reported by: F. Hoehndorf. 100p.
The practical application of the material described in this report makes possible complete analytical representation of the lifting power of air currents used in the practice of gliding and gives a summary of all gliding meteorological problems which are of importance in practice. The report is a study of the combined action of lifting powers, friction and inertia of single air particles. Tables, sketches and a bibliography are included. The report is in German.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1065

UNCLASSIFIED

SUN RADIATION MEASUREMENTS MADE WITH AN AIRPLANE AT ALTITUDES UP TO NINE KILOMETERS. Reported by: U. Krug-Pielsticker. 82p.

This report describes experiments and measurements on sun radiation, taken with a recording actinometer, at heights up to 9,000 meters. In addition, data on atmospheric humidity and temperature were recorded. The report summarizes the results which were obtained in Germany and gives complete details on a new measuring device which was developed to meet special test flight requirements. Tables and graphs are included. Text is in German.
Item No. 22

FIAT REPORT NO. 1070

UNCLASSIFIED

TECHNICAL AND SCIENTIFIC DEVELOPMENTS RELATED TO THE ASBESTOS INDUSTRY IN GERMANY. Reported by: G. M. Bloomfield. 48p. This report reveals some processes and methods applied by the German asbestos industry which were considered sufficiently valuable to be reported. A detailed plan is given on preparing and automatic batching and mixing of asbestos spinning stock. Cards for producing yarn from short asbestos fibers are described as are some auxiliary machines and installations. A report is given on the subject of elimination of dust for the prevention of silicosis (asbestosis) and findings by research workers in the medical field are submitted. The results of the attempted synthesis of asbestos are presented, based on already published and hitherto unpublished papers and on personal interviews with people concerned. Five appendices are included, containing a list of German personnel interviewed; a bibliography; a report on synthetic asbestos by Prof. Wilhelm Eitel (German text); a report on production of synthetic fiber by Dr. Rudolf Leutz (German text); and a list of photographs, drawings and diagrams.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1071

UNCLASSIFIED

CHLORINATED POLYVINYL CHLORIDE. Reported by: C. F. Reubensaal
19p.

Two processes are described in detail, one dealing with solvent, the other with suspension chlorination, used in the manufacture of the German plastic material, known as "PC" (chlorinated polyvinyl chloride). One product with highest softening point was mainly used for fibers and textiles; the other, with highest solubility, for laquers and adhesives. Flow sheets of the two processes and a drawing of the precipitator used are incorporated in the report.
Item No. 22

FIAT REPORT NO. 1072

UNCLASSIFIED

PASTE DISPERSIONS OF POLYVINYL CHLORIDE. Reported by: C. F. Reubensaal. 16p.

Describes a rapid, economical means of fabricating plasticized polyvinyl chloride articles by means of resin dispersions in plasticizer. Properties of suitable resins and plasticizers, and methods used to compound them into pastes are reported. Methods of use and fields of application in Germany are compared to existing American practices. Lists of German firms using pastes, lists of miscellaneous paste formulae, and lists of patents covering paste applications are appended.
Item No. 22

FIAT REPORT NO. 1073

UNCLASSIFIED

THE MANUFACTURE OF ACETOACETIC ACID ETHYL ESTER AT I. G. FARBENINDUSTRIE A. G., HOECHST AM MAIN, GERMANY. Reported by: C. C. Kennedy and L. K. Frevel. 13p.

A description is given of the manufacture of acetoacetic acid ethyl ester by the interaction of sodium ethylate and ethyl acetate. Detailed information is also given on both the Wacker process for anhydrous sodium ethylate and the various recovery units for benzene, ethyl alcohol, and ethyl acetate. The ethyl ester of acetoacetic acid is used in the manufacture of antipyrine, pyramidon, and intermediates for dyestuffs. A flow diagram for the production of the acetoacetic acid, ethyl ester at this plant (Wacker process) is included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1074

UNCLASSIFIED

SODA ASH MANUFACTURE IN SOUTHERN AND WESTERN GERMANY.

Reported by: F. Will and R. Largent. 48p. A survey of the German soda ash industry supplementing previous reports on the subject, with emphasis on operating practices, plant capacities, and technical performances; contains drawings of typical equipment, operating and manufacturing cost data. Four of the six plants visited were producing soda ash at rates well below capacity. Shortages of coal, transportation equipment, and, in some instances, labor are restricting operations. The abnormal conditions in Germany today distort operating efficiencies and manufacturing costs. German soda ash plants are relatively old and show little evidence of recent intensive research. Product quality is somewhat inferior to American standards. Additional information on waste heat recovery, filtration and feeding driers is included.

Item No. 22

FIAT REPORT NO. 1077

UNCLASSIFIED

MANUFACTURE OF PHENOL FORMALDEHYDE RESINS AND MOLDING POWDERS. Reported by: R. D. Dunlop. 75p.

This report should not be considered complete in itself; the phenolic resin industry is too complex to allow that, nor was it possible to visit all producers, as a comparison of appendix 2, and appendix 4 will show. Nevertheless, it is considered that the detail presented is sufficient to support the general conclusions presented. The report consists of three parts: Part I. Summary - an attempt is made to summarize the practices in this complex industry; Part II. Detailed description of processes - here, as factually as possible, the information regarding the practices of the various producers is recorded; Part III. Appendices and drawings - pressure conditions less than one atmosphere are given in millimeters of mercury. Numbers in parenthesis in text refer to bibliography. A series of drawings is attached to the report.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No.22

FIAT REPORT NO. 1079

UNCLASSIFIED

PRODUCTION OF ACETYLENE FROM METHANE IN A REGENERATIVE TYPE FURNACE. RUHRCHEMIE A. G., OBERHAUSEN - HOLTEN. Reported by: O. G. Direnga and P. J. Leaper. 50p.

About 10 years ago, Ruhrchemie Holten carried out experimental and pilot plant work on the production of acetylene from methane, by an intermittent process in which the methane is subjected to temperatures of 1400-1600° C at a pressure of 0.1 atmosphere absolute. The reaction vessel is a furnace filled with suitable packing. The process operates on a one minute heating-one minute reaction cycle. Methane is used for the heating as well as for the reaction. It was found that approximately 36% of the reaction-methane is converted to acetylene, 36% cracked to carbon and hydrogen, and 28% remained unchanged. The ratio of acetylene to carbon formation depends critically upon the reaction-pressure, and even a slight increase of the pressure shifts the ratio in favor of carbon formation. This report covers the experimental work done, and the conclusions derived from it. During the war, Ruhrchemie was engaged in the design of a large plant for a firm in Hungary. The design was largely completed, and drawings of important equipment units, flow sheets, manufacturing, and construction cost estimates for the projected plant are included. The plant was never constructed.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

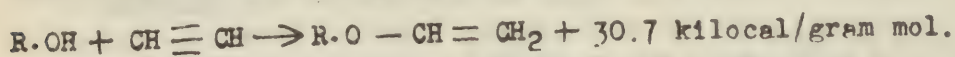
Item No. 22

FIAT REPORT NO. 1080

UNCLASSIFIED

THE LOWER VINYL ETHERS AND THEIR USE FOR ACETALDEHYDE MANUFACTURE. Reported by: P. J. Leaper and O. G. Direnga. 26p.

This report covers the manufacture of lower vinyl ethers by the reaction of acetylene with the lower boiling aliphatic alcohols under pressure, in the presence of a catalyst consisting of the potassium alcoholate of the respective alcohols. The method of operation and details of equipment are representative of those used at the I. G. Farbenindustrie Ludwigshafen. A brief description is also given of a projected pilot plant for the hydrolyses of vinyl methyl ether to acetaldehyde and methyl alcohol. It is understood that a pilot plant along these lines was constructed and operated at I. G. Farbenindustrie Ludwigshafen, but was destroyed by bombing early in the war. The vinyl ethers are prepared according to the following type reaction:



It is believed that enough detailed information has been assembled in this report to permit the construction of an experimental unit for manufacturing lower boiling vinyl ethers.

Item No. 22

FIAT REPORT NO. 1081

UNCLASSIFIED

MANUFACTURE OF DIETHYLAMINE FROM ACETALDEHYDE. I. G. FARBEINDUSTRIE A. G. LUDWIGSHAFEN. Reported by: O. G. Direnga and P. J. Leaper. 19p.

This report covers the manufacture of diethylamine, and the by-products monoethylamine and triethylamine, from acetaldehyde at Ludwigshafen. The manufacture of the corresponding butylamines is also discussed. A vapor phase catalytic process is used in which acetaldehyde is hydrogenated with hydrogen and reacted with ammonia to form the ethylamines. The reaction is exothermic and cooling must be provided to maintain the temperature of the catalyst at approximately 110-140° C., the optimum temperature depending on the activity of the catalyst. The process is conducted at approximately atmospheric pressure. The by-products monoethylamine and triethylamine are separated from the diethylamine and from the water formed by fractional distillation, and are normally returned to the reactor for conversion to diethylamine. The preparation of the catalyst is also described in this report. Two flow diagrams are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1082

UNCLASSIFIED

STATUS OF DEVELOPMENTS IN THE GERMAN DIAZOTYPE REPRODUCTION PROCESSES. Reported by: S. C. Slifkin. 16p.
This report summarizes production, research, and development data of Kalle & Co. A. G., Biebrich am Rhein, leader in the German diazotype industry (which is based upon the light sensitivity of certain dyestuff intermediates). Some information is given on raw paper made for diazotype sensitizing, and a new super-high pressure mercury vapor lamp is reported which is of potential interest as a powerful new light source.
Item No. 22

FIAT REPORT NO. 1085

UNCLASSIFIED

THE OXIDATION OF METHANE. Reported by: M. M. Holm and E. H. Reichel. 28p.
This report describes two German processes for the oxidation of methane to formaldehyde with air or oxygen. The first process using a nitric oxide catalyst, was developed by the Gutehoffnungshuette A.G. of Oberhausen and has been in commercial operation for several years. The second process, using a combination of ozone and barium peroxide as catalyst, was under experimental development during the war years by the Hibernia Company at Herne. Bibliography, drawings, diagrams, and copies of German patent applications are attached.
Item No. 22

FIAT REPORT NO. 1088

UNCLASSIFIED

UBER FILME UND MISCHFILME VON LANGKETTEN DIBASISCHEN ESTERN (FILMS OF PURE AND MIXED LONG CHAIN DIBASIC ESTERS).

Reported by: H. J. Trurnit. 21p.

F/A diagrams (pressure/area relationships) of films formed by long chain dibasic esters are reported and discussed. The relationship of the results with Langmuir's theory is considered and differences between the type of films delimited. Films of various molecular ratios of two dibasic esters indicate that it is possible to stabilize unstable films to a considerable extent.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1089

UNCLASSIFIED

VERTICAL MOVEMENT IN THE ATMOSPHERE. Reported by: F. Moeller. 5p.

Based on the continuity equation, a formula is developed for the calculation of vertical movement on a large scale, such as is found in cyclones and anticyclones. The formula correlates the horizontal currents with the deviation from the gradient wind, which in turn are caused by the changes in pressure gradients. According to the theory, the distribution of the flow on the fronts depends on whether the displacement of a low is greater or less than the ground-flow passing through it. For example, for a young, fast-moving low, there results on its front, at all heights, an upflow and on its back a downflow, which is in good agreement with observation but in contradiction to the Norwegian cyclone-scheme. For an aging low, whose pressure gradients are decreasing, there is a somewhat different distribution of the flow processes: The upflow region at the front remains; following this, in the region of the cold-front which has already progressed to the south-side of the low, there is an off-wind zone with clearing conditions, and in the following cold air zone (postfrontal) again a bad weather field. The author has been meteorologist at the Institute of Meteorology and Geophysics of the University of Frankfurt Main since 1938. The text of this report is in German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1090

UNCLASSIFIED

ABOUT INHERITANCE OF THE BLOSSOMING AGE OF EARLY AND LATE BLOOMING SUMMER-ANNUAL STRAINS OF ARABIDOPSIS THALIANA.

Reported by: L. Harer. 24p.

The inheritance of the blossoming-age was tested on five cross-breeds of early and late summer-annual Arabidopsis strains under approximately constant surroundings under artificial light. The distribution of inherited factors pointed to a unifactorial splitting of early and late blossoming with the late-blooming factor incompletely dominant. It is most likely that multiple alleles of this gene effect the various intensities of early and late-blooming. Under favorable conditions (short day) further modifying genes become apparent. The hairiness of leaves is inherited independent from blossoming age, and is dominant and unifactorial. Tables, graphs and bibliography are included. The author studied botany at the University of Frankfurt/Main, where she obtained her degree in 1945 with the present thesis. The text of this report is in German.

Item No. 22

FIAT REPORT NO. 1091

UNCLASSIFIED

I. ASPHALT LINING OF CANALS AND STORAGE BASINS. II. ASPHALT LINING OF VERTICAL WALLS. Reported by: O. Kirschmer. 33p.

The first manuscript deals with the application of asphalt linings to canals and storage basins. Many years' experiments carried out at the research institute in Obernach/Isar on a natural scale and under normal weather conditions showed that a saturation layer or cold asphalt are less suitable, especially during severe winters, than rolled and cast asphalt. Asphalt packings are compared with loam and concrete packings in regard to their characteristics. The second paper is concerned with testing of asphalt insulation of vertical brick-walls, with particular emphasis to waterproofing. The performance of several types of asphalt applications are compared over a period of three years. Sketches and numerous photographs as well as a bibliography are included. This manuscript is in the German language.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1093

UNCLASSIFIED

THE INFLUENCE OF LENGTH OF DAY AND OTHER FACTORS ON THE FLOWERING OF SELLAGINELLA MARTENSIL SPR. Reported by: F. Laibach. 27p.

Experiments show that the flowering of the above fern is affected by the duration of daylight to the extent that it takes place at all only when there is a day-and-night cycle, and flowering is earlier and more intense on a short day (eight hours) cycle than on a long day (sixteen hours) cycle. Flowering is also inhibited in seedling cultures and by high atmospheric humidity. High light intensity favors flower-formation. The significance of these results, which are one of the first proofs of photoperiodicity of spore-bearing plants, is discussed. In German.

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MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1094

UNCLASSIFIED

EFFECT OF LIGHT ON THE GERMINATION OF SEVERAL STRAINS OF ARABIDOPSIS THALIANA L. HEYNH. Reported by: I. Kugler. 20p.

This study was carried out at the Botanical Institute of Frankfort University. Although some light-germinating seeds can be germinated in the dark by application of certain chemicals or temperature cycles, the light-germinating Arabidopsis strain Hm could not be caused to germinate in the dark. After removal or injury of the shell, however, germination took place in the dark also. Cross-breeding of light-germinating Hm and in differently germinating strains proved that not primarily the seed-shell but the inside of the seed is responsible for the ability to germinate in the dark. It is assumed that the shell is of secondary importance in that it does not permit the transmission of the antigermination catalysts which are formed during the germination in the dark of light-requiring seeds. A bibliography of 26 items is attached. In German.

Item No. 22

FIAT REPORT NO. 1095

UNCLASSIFIED

VERDAMPFUNGSGLEICHGEWICHTE BINARER KOHLENWASSERSTOFFGEMISCH (VAPOR-LIQUID EQUILIBRIA OF BINARY HYDROCARBON MIXTURES). Reported by: L. Sieg. 20p

The following tables present the vapor-liquid equilibria of a large number of hydrocarbon mixtures, generally with one component being aromatic or cycloparaffinic. The experimental work was done in modified Othmer and Scatchard equipment, using highly purified chemicals. Analysis of the mixture was made by refractive index. The tables are self-explanatory. The following mixtures are dealt with: (1) Benzene - n-heptane; (2) benzene - cyclohexane; (3) benzene - iso-octane; (4) benzene - methylcyclohexane; (5) n-heptane - toluene; (6) iso-octane - toluene; (7) n-hexane - toluene; (8) benzene - n-octane; (9) benzene - 2,2,3-trimethylbutane; (10) n-octane - p-xylene; (11) cyclohexane - toluene; (12) cyclohexane - n-heptane; (13) n-heptane - methylcyclohexane; (14) iso-octane - methylcyclohexane; (15) n-heptane - iso-octane. In German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1096

UNCLASSIFIED

THE SCHARDINGER DEXTRINS FROM STARCH. Reported by: K. Freudenberg. 9p.

This study, which was carried out in the Chemical Institute of Heidelberg University, reinvestigates methods of isolation and properties of the α -, β - and γ -dextrins, first isolated in crystalline state from starch by Schardinger. Analysis and molecular weight determinations indicate α -dextrin to be a cyclic pentose and β -dextrin to be a cyclic hexose. γ -dextrin has a higher carbon and hydrogen content than either α - or β -dextrin. Other less soluble dextrins were also isolated. In German.

Item No. 22

FIAT REPORT NO. 1102

UNCLASSIFIED

POLYMERIZATION OF VINYL ACETATE. Reported by: S. J. Baum and R. D. Dunlop. 52p.

This report covers the polymerization of vinyl acetate at the I. G. Farbenindustrie plant at Höchst and at the Dr. Alexander Wacker plant at Burghausen. Both companies manufactured their own monomer, practically the entire production of which was used internally. Polymerization processes practiced at both plants were somewhat similar in that dispersions, pearl, solution, and bulk processes were used. Processing details for the several products were comparable, the outstanding differences being in formulations and in the use of continuous bulk and solution polymerization at Höchst. The Höchst products were known as Mowilith types and the Burghausen products as Vinnapas types. A description of special raw materials is given, including the preparation (in German) of di-o-toluyll peroxyd and of diolelyl peroxide. Flowsheets and plant log sheets for processes of major interest are included. A few related reports are listed.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1103

UNCLASSIFIED

PROTECTIVE COATING OF MIRROR SURFACES WITH AN OXIDE OF SILICON. Reported by: J. E. Tausz and M. Tausz. 11p.

The coating of mirror surfaces with an oxide of silicon is described. The process is carried out in high vacuum, using a heating element to volatilize the oxide. The oxide deposits on the mirror surface to form a hard coating to protect against abrasion. The oxide of silicon is of doubtful composition but is a lower valence compound or mixture than the dioxide. Its preparation by sublimating a mixture of silicon and silicon dioxide is given. Also a description of a method for testing the scratch resistance of the coated mirrors is presented. Three sketches of apparatus are included.

Item No. 22

FIAT REPORT NO. 1107

UNCLASSIFIED

MANUFACTURE OF ETHYLENE BY REDUCTION OF ACETYLENE. Reported by: P. J. Leaper and O. G. Direnga. 24p.

With no available natural gas source, Germany was forced to synthesize ethylene. One of the synthetic methods was to reduce acetylene. This was done by using a palladium catalyst on silica gel and hydrogenating at atmospheric pressure. This type catalyst gave very little conversion to ethane and other saturated hydrocarbons and thus permitted a recycle procedure. This report covers this process and includes a detailed layout drawing of the Linde purification plant. Yields by the process were 85% of theory and the ethylene was 94% to 96% pure. By-product oils composed of higher hydrocarbons account for most of the remaining 15% of the yield, and a market had been found for these as solvents, etc.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1108

UNCLASSIFIED

APPLICATION OF RESIN DISPERSIONS. Reported by: S. J. Baum
22p.

This report covers the industrial application of resin dispersions manufactured by emulsion polymerization of synthetic monomers. The composition and properties of the various dispersions are described and the applications as adhesives, binders, coatings, impregnants, and textile sizes are discussed.

Item No. 22

FIAT REPORT NO. 1109

UNCLASSIFIED

PRODUCTION OF POLYVINYL ACETALS. Reported by: R. D. Dunlop. 18p.

This report describes the production of polyvinyl acetals at I. G. Höchst and Dr. Alexander Wacker, G.M.B.H., Burghausen. The Höchst plant was the only plant equipped for the production of polyvinyl acetal resins, as only rather simple solutions were prepared at Burghausen. The acetaldehyde acetal was selected for exploitation by both producers because acetaldehyde was immediately available in the plant. Some sporadic work was also done with other aldehydes. Two flowsheets illustrate the production of an acetaldehydic acetal, mowital 070 (Hochst) and a butyraldehydic acetal, Piologorm B (Burghausen).

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1110

UNCLASSIFIED

THE PRODUCTION AND USE OF POLYVINYL ALCOHOL. Reported by:
R. D. Dunlop. 14p.

Polyvinyl alcohols are produced by I.G. Farbenindustrie, Hoechst, and Dr. Alexander Wacker G.m.b.H., Burghausen. I.G. Farbenindustrie produces polyvinyl alcohol by hydrolyzing or saponifying, vinyl acetate in methanol by means of an acid catalyst. Wacker utilizes small quantities of alkali as the catalyst for the hydrolysis. Both producers were the major consumers of their own products. In both cases the product was used as an emulsifying agent. There are a variety of other small applications. One of the most interesting applications is the production of plastics of unusual toughness. This report should be considered one of the series of FIAT Reports on the utilization of vinyl acetate and the conversion of that material into useful resins.

Item No. 22

FIAT REPORT NO. 1112

UNCLASSIFIED

DETERMINING THE SHAPE OF AGGREGATE GRAINS BY SIFTING.
Reported by: F. Schiel. 19p.

This report, which includes a translation, describes a new test method for evaluating the quality of the shape of the particles in an aggregate sample by means of sieve analyses. An automatic method called the "Kornfallprüfung" (grain-dropping test) was worked out by the author and published in "Forschungsarbeiten aus dem Strassenwesen", Band 29, 1941. Sifting analyses are tabulated and a sifting curve is given. Appendix I contains a bibliography, and Appendix II the original report in the German language.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1114

UNCLASSIFIED

RECENT GERMAN RESEARCH WORK ON FLUORINE AND FLUORINE COMPOUNDS. Reported by: W. Kwasnik and P. Scherer. 61p.

This report contains two papers written by German fluorine chemists. Dr. Kwasnik's paper presented in German is entitled "Neues über Fluor und anorganische Fluoride." It covers the preparation and description of inorganic fluorides and the preparation of elemental fluorine, a comprehensive bibliography is given as well as a number of tables which list the various fluorine compounds, and numerical data on the operation of the electrolytic fluorine cell. Several drawings show the construction of various fluorine cells, and apparatus for the preparation of carbontetrafluoride, chromium trifluoride and of uranium hexafluoride. Dr. Scherer's paper translated into English is entitled "Recent Research on the Chemistry of Organic Fluorine Compounds up to the end of 1944." He covers the preparation of organic fluorine compounds and their application in various fields. The use of aliphatic fluorine compounds for (a) refrigerants, (b) low temperature heat exchange liquids, (c) dielectric fluids, and (d) in the plastics field. A large part of the paper is devoted to the discussion of aromatic fluorine compounds and their use in the dyestuff field. Insecticides are also covered.

Item No. 22

FIAT REPORT NO. 1117

UNCLASSIFIED

TREATMENT OF SPENT PICKLING LIQUORS CONTAINING SULFURIC ACID AND IRON SULFATE. Reported by: G. M. Ornsen. 46p.

A description is given in this report of the processes employed in Germany for the treatment of spent pickling liquors resulting from the use of sulfuric acid for the pickling of iron and steel. The application of these processes yields the following advantages: (A) Prevents large amounts of chemicals, namely iron sulfate and sulfuric acid, from reaching the receiving streams and thereby polluting public water courses; (B) Recovering useful materials, namely iron sulfate and sulfuric acid; and (C) Improve the pickling process by affording a pickling bath of substantially constant composition. Appendix 1, List of German personnel interviewed; Appendix 2, List of targets visited; Appendix 3, Bibliography; and Appendix 4, Drawings and graphs.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1120

UNCLASSIFIED

LARGE SCALE PRODUCTION OF OXYGEN. Reported by: L. E. Carlsmith. 96p. This report is a compilation of miscellaneous information on the subject of the production oxygen on a large scale in Germany not heretofore presented in the various reports on the subject by Allied technical inventigators. Previous inventigators have confined their efforts almost entirely to studying the Linde-Frankl process. Considerable space in this report is devoted to the activities of the Messer company, the principal other manufacturer of large scale air separation plants in Germany. The important matter of explosion hazard of acetylene in oxygen units again was reviewed with both manufacturers and users of oxygen producing equipment. The production of oxygen without resort to the customary practice of compressing a portion of the air to relatively high pressures was taken up with both the Linde and Messer organizations. Their views are presented. A study was made of the sources of data on the physical constants of gases employed in the design of German air separation process. It was revealed that the Germans do not know of any existing or proposed installations of the Kapitza (Russian) oxygen process. They look upon the claims reported for the process as somewhat extravagant. Fifty-one figures are presented. These include reproductions of German charts for physical constants of gases, flow sheets of existing and proposed plants and cycles, detailed drawings of equipment, units, and layouts, and miscellaneous items.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

ITEM NO. 22

FIAT Report 1118

UNCLASSIFIED

GERMAN SYNTHETIC SAUSAGE CASINGS INDUSTRY. Reported by:
A. G. Hewitt. 28p.

This report covers the various manufacturing processes employed in Germany during the war for the production of thin-wall tubing to be used for synthetic sausage casings. Raw materials and process details are included; equipment is discussed in some detail; and figures for production output and capacity are given. There are drawings of several important pieces of production equipment.

Item No. 22

FIAT REPORT NO. 1122

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT I. G. FARBEN-INDUSTRIE, UERDINGEN. Reported by: A. Hass and G. H. Gloss. 42p. This report gives an alphabetical subject index to laboratory reports microfilmed at I. G. Farbenindustrie, Uerdingen.

Item No. 22

FIAT REPORT NO. 1123

UNCLASSIFIED

PRECAST CONCRETE PRODUCTS INDUSTRY IN GERMANY. Reported by: M. A. Arnold and O. L. Formigli. 72p.

This report reviews the German precast concrete industry and the progress made in the design and use of precast concrete units in German building. German precast concrete floor systems and precast concrete joists are presented in detail. Various types of lightweight concretes are reviewed and summarized. Numerous miscellaneous precast concrete items of unusual interest are presented and reviewed. Bibliography, drawings and tables are included.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1125

UNCLASSIFIED

MANUFACTURE OF ACRYLONITRILE BY ADDITION OF HYDROCYANIC ACID TO ACETYLENE. Reported by: F. Nill and R. Largent. 20p.

Supplementing previous reports on the subject of the manufacture of acrylonitrile by addition of hydrocyanic acid to acetylene, this report presents additional detailed information on the process successfully engineered by I. G. Farbenindustrie. The development of the important reaction vessel, optimum operating conditions for the reactor and the reasons therefor, present treatment and proposed purification of recycled reactor exit gas.

Item No. 22

FIAT REPORT NO. 1128

UNCLASSIFIED

RUBBER REINFORCING CARBON BLACKS FROM NAPHTHALENE AND ANTHRACENT (CK3 AND CK4 BLACKS). Reported by: Fred S. Thornhill. 39p. Manufacturing and operating descriptions are given for the production of the German rubber reinforcing carbon blacks, CK3 and CK4. As raw material, the aromatics such as naphthalene, anthracene residue, or anthracene oil are used, giving yields of over 60%. The construction details are on microfilm 158--AX. Manufacturing costs in terms of raw materials, utilities, labor and replacements are presented.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1132

UNCLASSIFIED

THE SINGLE SCATTERING AND ANNIHILATION OF FAST POSITRONS.
Refer to Item No. 9 for a complete listing of this report.

Item No. 22

FIAT REPORT NO. 1134

UNCLASSIFIED

X-RAY STUDY OF MAGNESIUM OXIDE. Reported by: R. Brill.
17p.

The electron distribution in the MgO grid is determined by means of the Fourier synthesis. The lowest electron density between ions is found to be only 0.6 El. Å², while the comparable value for NaCl is 0.23 El. Å². Three dimensional analyses show that in the MgO grid higher electron densities are found at all locations sufficiently far from the atomic centers than are found in NaCl or other alkali halides. This is ascribed to the fact that in MgO there exists already an intermediate condition between ionic and covalent bond. Text in German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1135

UNCLASSIFIED

CROSSBREEDINGS BETWEEN COLEUS-SPECIES OF A LONG AND SHORT DAY CHARACTER. Reported by: F. Laibach. 17p.

The hereditary succession of the dependence on the length of day is known for the flower formation of *Nicotiana Tabacum* L. Here the long-day character or the day-neutral character respectively dominate over the short-day character. Research was continued to find out whether these results observed in tobacco, the only test object used thus far, have general validity. Two species of *Coleus*: *C. Frederici*, a short-day plant, and *C. Blumei* Benth., a long-day plant, proved to be favorable objects for scientific experiments. In crossbreeding the short-day character of *C. Frederici* was dominant over the long-day character of *C. Blumei* (dominating ratio was reversed compared with tobacco). The F_1 of the crossing *C. Blumei* X *C. Frederici* was sterile. Experiments in polyploidization with colchicine resulted in an amphidiploid hybrid of high grade fertility. The latter also differed from the diploid F_1 hybrid in the size of pollen grains, fissure openings, and glandular hairs on the corolla. The vegetative development of the amphidiploid compared with the diploid is hampered, whereas in photoperiodical behavior both are alike. The short-day character is also maintained in triploids (from a crossing amphidiploid ♀ X *C. Frederici* ♂ (short-day parent) and *C. Blumei* ♂ (long-day parent). The triploids are self-sterile, fertile with pollen of *C. Frederici* and *C. Blumei* and pollen of the amphidiploid. In German, with abstract and biographical note in English.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1136

UNCLASSIFIED

PRESSURE HYDROGENATION OF SULFITE LIQUOR. Reported by: W. Stumpf. 13p.

This paper describes how the pressure hydrogenation of sulfite waste liquor in an aqueous alkaline medium is catalyzed at 350° C. and at high hydrogen pressure, under the effect of the autoclave wall, without the addition of catalysts. While silver and low alloy steels have poor catalytic properties, nickel, chromium and nickel-steel and chromium-steel alloys are suitable catalysts. Chromium-steels with more than 11 percent chromium content have good catalytic qualities. Satisfactory hydrogenation with layer separation and clarity of the liquids is obtained only with a NaOH-lignin ratio of 4 : 5 and more. The final product always consists of both neutral substances, phenols and acids. Low concentrations result in good yields of neutral substances, high concentrations in a low alloyed autoclave yield acids as chief products. Apart from the hydrogenating effect of the hydrogen medium, one-third of the hydrogen requirements is obtained from incidental reactions, the most important of which is formation of acids and alcohol through the aqueous alkali. In German.

Item No. 22

FIAT REPORT NO. 1137

UNCLASSIFIED

KINETICS OF THE FORMATION OF DICYCLOPENTADIENE IN THE VAPOR PHASE. Reported by: G. R. Schultze. 24p.

The Kinetics of the formation and decomposition of dicyclopentadiene C_5H_6 - C_5H_6 in the vapor phase were investigated by means of pressure observations in the range of 180 to 510 mm, with temperatures ranging from 132° C. The formation was found to be a bimolecular reaction of the second order, and the decomposition a monomolecular reaction of the first order; the calculated velocity coefficients were satisfactorily constant from the beginning to the immediate neighborhood of the equilibrium. A set of 27 formulas for computation is given in the theoretical section of the report. In German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1138

UNCLASSIFIED

KINETICS OF THE FORMATION OF DICYCLOPENTADIENE IN PURE LIQUID PHASE. Reported by: G. H. Schultze and G. A. Melkolian. 19p.

The kinetics of the formation of α -dicyclopentadiene from pure liquid cyclopentadiene was investigated in the temperature range of 25-90° C. The considerable increase of the velocity coefficient for the second order reaction, which was observed in each experiment, could be reduced to constancy by taking into account the auto-catalytic effect of the dicyclopentadiene produced. If it is assumed that the auto-catalytic acceleration takes place by means of a triple-collision mechanism, which seems possible in the liquid phase, then the reaction scheme leads to the differential equation used as basis for the calculations. In German.

Item No. 22

FIAT REPORT NO. 1139

UNCLASSIFIED

KINETICS OF THE FORMATION OF DICYCLOPENTADIENE IN DILUTED LIQUID PHASE. Reported by: G. A. Melkolian and G. R. Schultze.

The kinetics of the formation of dicyclopentadiene were studied at various temperatures and in various solvents. Constant velocity coefficients could be calculated by taking into account the continuous change of the system due to the dicyclopentadiene formed, whose relative importance depends on the original concentration of monocyclopentadiene. The velocity coefficients are not significantly affected by change of the solvent medium. The 13 studied solvents can be arranged into three groups, namely "accelerating", "indifferent", and "decelerating". The reaction constants and activation energies are of the same order of magnitude as those for the pure liquids which was to be expected. In German, with abstract and biographical notes in English.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1140

UNCLASSIFIED

THE DIFFUSION AND ABSORPTION OF RESPIRATION GASES. Reported by: H. Goepfert. 16p.

This study was carried out at the Division of Experimental Pathology and Therapy in the W. G. Kerckhoff Institute for Heart Research, Bad Nauheim, Germany. Described is a method by which the diffusion process of respiration gases in water or aqueous salt solution can be observed. The theoretical calculations are derived from the diffusion formula. A special photographic method of measurement is used for the determination of ascending speed and ascending time of the gas bubbles. The results have been statistically evaluated and are graphically demonstrated. In German.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1141 and Supplement.

UNCLASSIFIED

SYNTHETIC DETERGENTS AND RELATED SURFACE ACTIVE AGENTS IN GERMANY. Reported by: J. D. Brandner. 120p.

The report gives the comparative evaluation of synthetic detergents as produced and tested in Germany. Research work carried out in the principal German industrial laboratories on surface active agents immediately before and during the war is described. In several instances this work led to pilot plant installations which are also covered. A number of plant processes for products being manufactured are included. A list of all the synthetic detergents and related products made in Germany has been compiled and arranged alphabetically by trade name. The composition and reference to the source of information is given. Lists of documents, and drawings and bibliography are attached.

Item No. 22

FIAT REPORT NO. 1142

UNCLASSIFIED

A NUBILOSA SPRAY DRIER FOR THE DRYING OF POLYVINYL CHLORIDE. Reported by: R. Ladisch. 15p.

The report, in German, describes particularly the principles involved in the design of the spray nozzles and drying chamber, wherein a liquid is sprayed into the finest particles (mist) by means of a rotating stream of compressed air and the mist dried by a concurrent rotating stream of hot air. Drawings are attached.

Item No. 22

FIAT REPORT NO. 1143

UNCLASSIFIED

THE INDUSTRIAL ABRASIVE INDUSTRY IN GERMANY. Reported by: J. Jackson and L. Jackson. 7p.

This report reviews the field of German abrasive practice and development during the war years and summarizes the most significant accomplishments. The practice includes the substitution of a sulfur base material (manufactured by Chemolith G.m.b.H., Neu Isenburg) for lead which is commonly used in bushing arbor hobs. Officials of Chemolith stated, however, that this substitute was not as good as lead. Appendix 1, List of personnel interviewed; Appendix 2, List of targets visited; and Appendix 3, Bibliography.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1144

UNCLASSIFIED

UTILIZATION OF TALL OIL IN GERMANY. Reported by: J. F. Rooney. 24p.

This report covers the utilization of tall oil as a substitute for linseed oil and rosin in the surface coating and linoleum industries, as practiced by a representative group of manufacturers engaged in the above industries. The types of formulae contained in this report include alkyd resins, modified phenolic resins, tall oil esters, and linoleum paste, all standard production items of the firms investigated. A bibliography is attached.

Item No. 22

FIAT REPORT NO. 1146

UNCLASSIFIED

PREPARATION OF ROCHELLE SALT CRYSTALS. Reported by: A. M. Wiggins. 7p.

Details of the processes used for growing Rochelle salt crystals from the solution are described in this report. The methods of cutting the crystals and the tools used for cutting are described, along with the methods of applying electrodes and the material used in the electrodes.

Item No. 22

FIAT REPORT NO. 1150

UNCLASSIFIED

FURTHER ADVANCES IN THE GERMAN CERAMIC INDUSTRY. Reported by: V. Fisher. 12p.

This report covers an investigation made in certain German ceramic factories producing electrical porcelain and chemical stoneware. The object was to complete, where possible, any fragmentary information gathered before and to ascertain which progress, if any, had been made on matters which were in the laboratory stage when last investigated. Photograph and tables are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1154

UNCLASSIFIED

HIGH TEMPERATURE CHLORINATION OF METHANE AT HULS. Reported by: J. A. Neubauer. 5p.

The equipment and the process used to produce carbon tetrachloride by the high temperature chlorination of methane is described. The process consists of a two-stage burning of methane with chlorine. The excess chlorine in the first stage acts as a diluent, while the hydrogen chloride gas formed by the first stage burner acts as a diluent in the second stage burner.

Item No. 22

FIAT REPORT NO. 1159

UNCLASSIFIED

THE PRINTING INK INDUSTRY OF GERMANY. Reported by: A. Voet. 19p.

Among the developments of interest to the American inkmakers are the following: 1. water-based gramure inks, 2. water-based aniline inks, 3. method of applying segmented aniline inks, and 4. satisfactory offset and letter press inks virtually without drying oils. A number of examples of printing inks of the offset and letter press type are given, taken from the files of different manufacturers. In each case the representative varnishes are included at end.

Item No. 22

FIAT REPORT NO. 1166

UNCLASSIFIED

DEVELOPMENT OF VINYL ACETATE COPOLYMERS AT I. G. FARBEN-INDUSTRIE, HOECHST. Reported by: J. G. Mark. 11p.

A large number of monomers were reacted with vinyl acetate under polymerization conditions in order to determine their reactivity and the properties of those polymers which resulted. This report concerns itself with those polymerizations which were successful and which have served or show potential promise of adaption, for the modification of the basic polyvinyl acetate molecule. In general, it was found that about 30% of co-monomer was necessary in order to significantly alter the physical properties of the basic vinyl acetate polymer.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1167

UNCLASSIFIED

THE CO - H₂ SYNTHESIS AT I. G. FARBEN A. G. Reported by: Dr. H. Zorn under the supervision of Dr. W. F. Faragher. 173p. The reports assembled in this publication were compiled by German technicians of the French occupation zone and represent the part played by I. G. Farben A. G. in the field of CO - H₂ synthesis (Volume I). They will supplement the reports on this subject made under the direction of Professor Dr. Friedrich Martin, former president of the Board Ruhrchemie A. G., Oberhausen-Holten-Ruhr, who brought together under his authority technologists of the Ruhrchemie, Lurgi, Brabag, and Rheinpreussen companies. In addition to the CO - H₂ synthesis studied at Ludwigshafen, there appear in volume II the report of Dr. Windler on the possibilities for practical application of his gas producer, and in volume III reports on polymerized gasolines. The initiative for this project belongs to Dr. W. F. Faragher, European Chief Field Intelligence Agency, Technical who with the cooperation of "Institut du Petrole de Paris" effected a Franco-American cooperation in collecting documents indispensable to the progress of science. Appendix included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1173

UNCLASSIFIED

QUANTUM THEORETICAL OBSERVATIONS TO THE PROBLEM OF HYDRO-CARBON BIRADICALS AND BIRADICALOIDS. Reported by: F. Seel. 19p.

Of the compounds discussed only the o-substituted derivatives of Tschitschibabin's, Schlenk's, and Theilacker's hydrocarbon are true biradicals (configurations with uneven number electron systems). Compounds which possess only a part of the properties of free biradicals are designated as biradicaloids. The substances described in this class are traced back or related to quinone types. For various electron systems the π -electron coupling energy is calculated. In German.

Item No. 22

FIAT REPORT NO. 1181

UNCLASSIFIED

ACTIVATED CARBON PRODUCTION IN GERMANY DURING THE WAR. Reported by: L. M. Blumenthal. 22p.

The report gives a general review of significant German developments during the war. Particular attention was paid the use of gas absorption carbons in the Fischer-Tropsch synthesis. An effort was made to combine activated carbon with regenerated cellulose in a satisfactory manner. Details and complete descriptions of various processes and applications are contained in the report. Attached are lists of German personnel interviewed, and targets visited, tables of plant production, trade names and designation of active carbons.

Item No. 22

FIAT REPORT NO. 1184

UNCLASSIFIED

FOURDRINIER WIRE AND WIRE CLOTH. Reported by: S. J. Broderick. 9p.

The fourdrinier wire and wire cloth industry were surveyed with a view towards finding any new developments in the industry. The many works were inspected beginning with the raw material, the wire as procured from the supplier, through the drawing operations, annealing, weaving and finally the seaming by welding. Lists of targets visited, and of German personnel interviewed, are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1186

UNCLASSIFIED

ACETYLENE CARBON BLACKS. Reported by: F. S. Thornhill. 18p.

Descriptions of two manufacturing processes of acetylene blacks are given. Both methods are based on the exothermic reaction. $C_2H_2 \rightarrow 2C + H_2 + 54.3 \text{ kg.-cal/mol.}$ The reaction is carried out either in a static process in closed tubes or in a continuous process operating in a flow system. A list of German personnel interviewed, targets visited, bibliography, samples evacuated, microfilm index and drawings, a flow sheet and diagram of reactor are appended.

Item No. 22

FIAT REPORT NO. 1187

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT I. G. FARBEN-INDUSTRIE A. G., HOECHST. Reported by: A. P. Bradshaw and B. W. Keith. 7 volumes.

The Hoechst plant is divided into five main production "departments", namely: (1) Inorganic, (2) pharmaceuticals, (3) intermediates, (4) dyestuffs, and (5) acetone, acetic acid, and plastics. In addition to these main departments, there are three divisions, (1) technical, (2) color, and (3) applied technical and six laboratories, (1) main, (2) catalytic, (3) pharmaceutical, (4) analytical, (5) inorganic, and (6) physical. The body of this report is divided into three parts. Item 1 (Vol. 1, p. 2-10) contains an alphabetical list of the general subject matter contained in each reel. Item 2 (Vol. 1, p. 11 through Vol. 7, p. 265) contains a detailed subject index of every document microfilmed, giving the reel and frame number for each. The subjects are listed alphabetically under the general headings approved and used by "Chemical Abstracts" in its classification of scientific research. Item 3 (Vol. 7, p. 266-285) contains an alphabetical listing by subject matter of all the documents on German industry standards.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1188

UNCLASSIFIED

MANUFACTURE OF PHOSPHATIC FERTILIZER BY THE RHENANIA PROCESS.
Reported by: M. M. Muller and H. C. Lee. 7p.

A study of the operating technique and the developments made by Kali-Chemie A. G. in the production of "Rhenania" phosphate at their Brunsbüttelkoog plant. This is one of the few companies that has made a satisfactory phosphatic fertilizer on a commercial scale by calcining rock phosphate with sodium salts and silica. The important phases of the process are the proportioning of the chemical constituents in the raw mix and the control of a rather difficult rotary kiln operation. Detailed information regarding the process and the plant has been given in the following reports: BIOS Final Rept. 94 (PB 18913, v. 1, p. 1295, this Bibliography), BIOS Final Rept. 582 (PB 34741, v. 2, p. 937), and FIAT Rept 665 (PB 18777, v. 1, p. 1217). This report purposes to supplement the information already available and is not intended to be complete in itself.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1189

UNCLASSIFIED

NOVEL GROUP OF LIPIDES (ACETAL-PHOSPHATIDES) AND THEIR
IMPORTANCE FOR LIPIDE METABOLISM. Reported by: R. Feulgen.
22p.

Novel group of lipides (acetal-phosphatides)
and their importance for lipide metabolism. May
1948.

22p tables

Mimeo: \$.75

1. Phosphatides—Germany 2. Lipoids—Metabolism—
Germany 3. Giessen. Universität. Institut für
Physiologische Chemie 4. FIAT FR 1189

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1190

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT FR. KRUPP, A. G.,
ESSEN. Reported by: F. W. Trembour. 8 volumes.

This report, in eight volumes, contains a classified listing of the titles of all interesting scientific and technical documents selected and microfilmed at the various Krupp plants in Germany, as part of the FIAT program in 1946 and 1947. Whereas the collected information deals largely with the two fields of steel and sintered carbide technology, the broad interests of the Krupp concern resulted in a diversity of endeavor reaching far into related industries. This wide activity is reflected in the subject matter of the reports listed. The reports are of all kinds, from short memoranda to lengthy treatises, and total about 2500 items, about 60,000 pages of written material. The contents vary in nature from details like mere hints, through unpublished patent applications, to broad developments of general significance such as work on high speed steels, iron ore reduction processes, corrosion and oxidation resistant steels and magnetic materials. Methods and processes of manufacture and test, products and applications of hundreds of different metallic materials of interest to industry and science are referred to in these reports. To present this information in usable form, a decimal subject index has been used in which the following are the main classifications:

000	Melting and Melts	covered in Volume I
100	Cast Bodies and Products	" " Volume II
200	Plastic Formed Materials	" " Volume II and III
300	Metal Joining	" " Volume IV
400	Surface Treated and Coated Metals	" " Volume IV and V
500	Powders and Sintered Products	" " Volume V
600	Non-Metallic Materials	" " Volume V and VI
700	Devices, Machines, Structures	" " Volume VI
800	General	" " Volume VI, VII and VIII

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Each of these main classes has been divided into a maximum of 10 subclasses and each of these into a maximum of 10 further subdivisions under which the individual article titles are finally listed. Thus, items on the use of carbide cutting tools, would be found under: 500 Powders and Sintered Products - , 510 Hard Tool Materials - , 513 Applications. For the purpose of maximum fidelity the original German titles have been retained. The microfilm reel and frame numbers according to which the papers can be identified at the Department of Commerce, Office of Technical Services are given for reference with each entry. An appendix in Volume VIII is a key to Krupp steel designations.

Item No. 22

FIAT REPORT NO. 1194

UNCLASSIFIED

PRODUCTION OF INORGANIC PHOSPHATE SALTS AT BAYERISCHE STICKSTOFFWERKE A. G., PIESTERITZ, GERMANY. Reported by: J. L. Keller. 6p. The plant of the Bayerische Stickstoffwerke at Piesteritz produced five inorganic phosphate salts by neutralization of the phosphoric acid made in the plant with sodium hydroxide. The production of four of these, sodium acid pyrophosphate, sodium neutral pyrophosphate, disodium phosphate crystals, and trisodium phosphate crystals offered no new or unusual features. The production of the fifth, sodium hexametaphosphate, although it was only in the pilot plant stage, presented a number of interesting details which are described.

Item No. 22

FIAT REPORT NO. 1198

UNCLASSIFIED

RESEARCH ON MYCOINES. Reported by: A. Lembke. 27p

Research on mycoines. May 1948.

27p photos, tables

Mimeo: \$.75

1. Antibiotics—Therapeutic uses—Germany
2. Mycoin C (Trade name) 3. Mycoines—Germany

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1199

UNCLASSIFIED

MANUFACTURE OF VINYL CHLORIDE BY MEANS OF LIQUID CATALYSTS.
Reported by: E. Kruta. 28p.

This report describes a process for the manufacture of vinyl chloride from acetylene and hydrogen chloride, using a solution of cuprous chloride in hydrochloric acid as the catalyst. The process may be operated with recycling of the unreacted gases, or it may be run as a single pass reaction without recycling. A discussion of the construction and operation of the apparatus is given, with the effect of the variables on the yield of vinyl chloride. The data have been drawn from laboratory experiments. A temporary, makeshift plant has been erected at the Badische Anilin und Soda Fabrik (formerly I. G. Farbenindustrie A.G., Ludwigshafen) which is described. The optimum design of a large scale plant is given with a discussion of the factors in the reaction conditions which influence the design and operation. The process has the advantage over the solid catalyst process of giving a purer vinyl chloride in about the same yield; the operation is, perhaps, simpler. The process described in this report has been tried out only in the laboratory and in a trial plant at Ludwigshafen. The data available come only from the laboratory; data from the Ludwigshafen plant, while interesting, would not be conclusive, as the design of the plant is admittedly makeshift and not the best possible. Diagrams of the apparatus in use, graphs, and flowdiagrams of the proposed plant are included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1200

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT I. G. FARBENINDUSTRIE A. G., KNAPSACK AND I. G. FARBENINDUSTRIE A. G., ZWICKEL.

Reported by: A. Hass. 7p.

This is a FIAT report presenting a subject index of documents microfilmed at I. G. Farbenindustrie A. G. für Stickstoffdünger, Knapsack, and at I. G. Farbenindustrie A. G., Zwickel. The documents deal chiefly with the production of calcium carbide and its derivatives, and ethylene oxide and its derivatives.

Item No. 22

FIAT REPORT NO. 1201

UNCLASSIFIED

SEPARATION OF FERMENTS USING SUBSTRATE COMBINATIONS. Reported by: Peter Pogacar. 16p. The modern methods used for the isolation of enzymes are based upon their physicochemical properties, which are characteristic for pure substances only. A successful preparation of a pure enzyme is both a chance and a proof of patience. It is preferable to prepare an enzyme-substrate compound, with which the specific activity of an enzyme can be utilized. In this method the reaction conditions are chosen in order to form the enzyme substrate, compound and to prevent, as far as possible a disintegration of the enzyme. The possibility of using this method was tested on the action of cellulase from the intestinal juice of the vine yard snail. About 75% of this enzyme is bound to the substrate while other enzymes and substances accompanying the cellulase are not held back.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1205

UNCLASSIFIED

WEATHER CONDITIONS NEAR THE GROUND DURING THERMIC WEATHER.
Reported by: F. Hoehndorf. 39p.

The formation of thermal up-winds are explained on the basis of temperature measurements made by the author. The measurements have in part been accompanied by simultaneous observations on smoke trails. The author's own observations on small wind whirls and similar weak atmospheric rotations, caused by local superheating, as well as on optical phenomena in the air near the ground during thermal weather, have also been explained. The report gives the physical explanation of the meteorological conditions in the air stratum near the ground, during thermal weather, favorable for the formation of weak atmospheric rotations, and the associated optical phenomena. Appendix I contains weather maps, and Appendix II contains a bibliography. Text is in German.

Item No. 22

FIAT REPORT NO. 1208

UNCLASSIFIED

SUPERCALENDERING OF CONDENSER PAPER. Reported by: S. J. Broderick. 19p.

Condenser paper as made at the SCHOELLER and HOESCH mill in Gernsbach is briefly described: a general description is given of the Haubold and Jos. Eckt & Soehne supercalenders.

Pertinent comments on the action of supercalender rolls at the surface of condenser paper as expressed by Professor Brecht of the Technische Hochschule of Darmstadt are presented. Sketches are included.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1209

UNCLASSIFIED

SYNTHESIS AND DECOMPOSITION OF VITAMINS IN THE ANIMAL AND VEGETABLE ORGANISM. Reported by: Arthur Scheunert. 25p. This is a survey of publications on the subject of Vitamin-synthesis in animal and vegetable organisms, having appeared from 1938 to 1946. Origin and accumulation of Vitamin B₁ in yeast, the influence of manuring on the content of vitamins in the crop, storage and transformation of Vitamin A, the effect of Vitamin D on rickets and the importance of vitamins E and K for gynecological problems are discussed. Some hints are given on synthesis of Aneurin (Thiamin) inside the animal organism.

Item No. 22

FIAT REPORT NO. 1210

UNCLASSIFIED

DIBROMOSALICYL AND RELATED SUBSTANCES. Reported by: Wolf-Helmut Wagner. 5p. R. Kuhn and collaborators were successful in synthesizing substances similar to sulfonamides in their chemical structure but without sulphur in their molecule. 4, 4' - diaminobenzophenol and 4, 4' - diaminobenzil reacted like sulfonamides but had less bacteriostatic effect. Salicyl and dibromosalicyl displayed a strong inhibitory effect on bacterial growth, but acted like phenol bodies.

Item No. 22

FIAT REPORT NO. 1262

UNCLASSIFIED

THE MANUFACTURE OF ACRYLIC ACID, AQUEOUS 50%. Reported by: A. S. Fromholz. 1p. Report was made to clarify certain details not covered in previous reports concerning manufacturing processes of acrylic acids, and is based on interview with Dr. Otto Baltz, I. G. Farben, Oppau. This report should only be used in conjunction with CIOS Report XXIX-62, "The Manufacture of Acrylic Acid at Ludwigshafen".

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1265

UNCLASSIFIED

ALKAZID GAS ABSORPTION PLANT MATERIALS OF CONSTRUCTION.
Reported by: A. Stanley Fromholz. 6p. Frequent reference has been made in the reports on German technology to the use of the reagent "Alkazid" for the absorption of carbon dioxide and hydrogen sulfide in the purification of gases for chemical synthesis. Information was obtained concerning the materials of construction required in the plant for the application of this reagent. Appendices include: German personnel interviewed - information contained in the files of the Inorganic Department Office at Ludwigshafen, and the bibliography.

Item No. 22

FIAT REPORT NO. 1266

UNCLASSIFIED

THE HORIZONTAL CHLORINE CELL SUPPLEMENTARY INFORMATION.
Reported by: A. Stanley Fromholz. 7p. An investigation was made at the Ludwigshafen plant of the I. G. Farbenindustrie to supplement information given in an earlier report on the horizontal chlorine cell. Objective, evaluation, discussion and appendices included. German personnel interviewed: Dr. W. Honsberg, Bibliography given.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1275

UNCLASSIFIED

MANUFACTURE OF TECHNICAL CERAMICS IN GERMANY FOR THE CHEMICAL INDUSTRY. Reported by: Edmund H. Knight. 27p. This report reviews German production methods in the fields of Chemical Stoneware and Chemical Porcelain during the Third Reich. Development in mechanical aids to production of large shapes, improved heat and shock resistant bodies, the use of applied glazes were the more important advancements made in the Chemical Stoneware industry. The extent of accurate grinding and polishing of both Stoneware and Porcelain parts had reached production level. The Chemical Porcelain industry had worked on alumina bodies without the use of pure alumina and had developed an air-foam porcelain body.

Item No. 22

FIAT REPORT NO. 1291

UNCLASSIFIED

REPORT ON THE RAMIE INDUSTRY OF GERMANY. Reported by: John P. Kottcamp. 41p. The purpose of this investigation was to obtain details regarding the development of the use of Ramie fiber in the textile field. These details included the design of special equipment, methods of operation, processes involved, raw materials used, labor requirements, rates of production, control methods, articles manufactured, cost figures (if available), and development work on new or novel uses of ramie. The investigation covered a series of interviews with persons having an intimate knowledge of the progress in the use of ramie, and visits to plants engaged in the manufacture of articles made from ramie. Also visits to some of the technical schools and laboratories engaged in research work on ramie.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1294

UNCLASSIFIED

THE THERMAL CRACKING OF ETHANE -- OPPAU PROCESS. Reported by: F. J. Sergeys. 18p. This report presents information on a process for the thermal cracking of ethane to produce ethylene as developed at Oppau and intended for large scale use at Heydebreck. Included are experimental data on the use of a copper nitrate - ethanolamine solution for the separation of olefinic gases from the cracking furnace outlet gas.

Item No. 22

FIAT REPORT NO. 1295

UNCLASSIFIED

THE CHLORINATION OF ETHANE A GAS-PHASE TYPE PLANT PROPOSED FOR HEYDERBECK AND A LIQUID-PHASE PILOT PLANT AT OPPAU. 20p. Report includes many diagrams and a table of contents. The diagrams show a schematic outline (thermal, gas-phase chlorination of ethane), flow diagram (photochemical, liquid-phase, chlorination of ethane) and equipment for the Heydebreck thermal gas-phase chlorination plant.

Item No. 22

FIAT REPORT NO. 1296

UNCLASSIFIED

THE MANUFACTURE OF DICHLOROPROPANE AND ALLYL CHLORIDE AT OPPAU. Reported by: F. J. Sergeys. 5p. This report presents information on the photochemical chlorination of propane to dichloropropane and the subsequent dehydrochlorination of this intermediate to allyl chloride as practiced at the I. G. plant at Oppau. The chlorination is a liquid phase photochemical reaction taking place at 20 atm. gauge. The dehydrochlorination is a thermal cracking reaction at 500°C. Maintenance of moisture-free streams is essential to prevent excessive corrosion of equipment.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1297

UNCLASSIFIED

OBSTVERWERTUNG HUMMEL & CO. WINNENDEN BEL STUTTGART. Reported by: Carl A. Rietz. This report is intended to supplement the previous investigations in the direction of the mechanics of operation involved in the processes of this fruit juice plant. Personnel interviewed: Mr. Fritz Krause. Numerous photographs included.

Item No. 22

FIAT REPORT NO. 1298

UNCLASSIFIED

THE MANUFACTURE OF 1, 4, 5, 8 - NAPHTHALENE TETRACARBOXYLIC ACID. Reported by: Ralph M. Osborne. 5p. This report represents essentially all the significant material available on the preparation of "Tetra Acid". Should further details be required, it would be advisable to send an investigator to the Hoechst plant to consult the chemist in charge of this product.

Item No. 22

FIAT REPORT NO. 1299

UNCLASSIFIED

MANUFACTURE OF METHANE CHLORINATION PRODUCTS IN I. G. HOECHST PLANT. 24p. The manufacture of chlorination products of methane in large scale is described. Illuminating gas is processed to substantially pure methane and is reacted with electrolytic chlorine. The resulting mixture of methyl chloride, methylene chloride, chloroform and carbon tetrachloride is collected and separated by fractional condensation and subsequent distillation. Part of methyl chloride is recycled.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1300

UNCLASSIFIED

GERMAN PROCESS FOR THE MANUFACTURE OF MESAMOLL PLASTICIZER FOR POLYVINYLCHLORIDE PLASTICS. Reported by: R. Bloom, Jr. 77p.

Mesamoll, which was a phenolic ester of a sulfonated hydrocarbon derived from hydrogenated first run $C_{13}C_{16}$ Fischer-Tropsch cuts, was manufactured in two steps. First, a sulfonchloride was produced by the reaction of the hydrocarbon with sulfur dioxide and chlorine simultaneously in the presence of ultraviolet light, with evolution of gaseous hydrogen chloride. The most suitable product was obtained

by carrying on the chlorination until it was only 50% complete. Following blowing with air to remove entrained HCl, the mixture of sulfonchloride and unreacted oil, known as Mersol and widely used as such as a detergent, was the raw material for the esterification step with phenol. The Mersol and a mixture of phenol, cresol, and xylenols were reacted together continuously in the presence of gaseous ammonia to produce Mesamoll. Solid ammonium chloride was precipitated from the reaction mass, and the unreacted oils, phenolic mixture, and ammonia were separated from the Mesamoll by vacuum steam stripping. Final purification was accomplished with fuller's earth. Although the German product varied in quality, it was generally found that polyvinylchloride plasticized with Mesamoll maintained good flexibility down to -18° to -20° C. The manufacture of "Mersol" and of "Mesamoll" is given together with a description of the process and equipment at Uerdingen accompanied by flow sheets, photographs, bibliography, patent applications, and definitions of German trade names and symbols.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT, REPORT NO. 1301

UNCLASSIFIED

APPLICATIONS OF DIISOCYANATES, SUPPLEMENTAL REPORT.

Reported by: W. H. Lockwood. 14p.

This report gives additional information on the applications of diisocyanates. The process of manufacture of the dimer of toluene diisocyanate is given. This dimer has certain application advantages over the monomer. Details are given for the application of Desmodur-Desmophen mixtures to textiles, leather, and paper. New plastic and adhesive compositions are reported. Lists of German personnel interviewed, targets visited and a bibliography are attached.

Item No. 22

FIAT REPORT NO. 1303

UNCLASSIFIED

KOPPERS POWDERED COAL GASIFICATION PROCESS. Reported by: Harold V. Atwell. 51p. H. Koppers G.m.b.H. of Essen, Germany, under the immediate direction of their Mr. Totzek conducted experimental work on the gasification of powdered coal from 1938 to 1944. The first unit was built in the Brabag-Schwarzheide plant and subsequent units were at Rheinpreussen Shaft IV near Homberg. In all cases the reactor was a horizontal drum with powdered coal introduced at one or both ends, and the gasifying agent, air or oxygen mixed with steam, being introduced at spaced points along the length of the drum so as to insure turbulent flow of the dust between inlet and outlet. Preheating of gasifying medium to about 1200°C. was concluded to be essential and Cowper stoves were used for this purpose. Operation was only at atmospheric pressure. The final Rheinpreussen unit was estimated to have a capacity of 10 tons of coal per day but it never operated successfully because of excessive cooling by the water jacket. Previous units were somewhat smaller and no runs longer than five or six hours had been made. No commercial units were built but several proposals were made on the basis of about 0.5 M³ oxygen consumption and 2M³ synthesis gas production per kg coal. No original experimental records were available to support claims made for the process.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1304

UNCLASSIFIED

GUMZ POWDERED COAL GASIFICATION PROCESS. Reported by: Harold V. Atwell. 53p. Cooperative experimental work on powdered coal gasification was conducted by Demag, Bergbau Verein and Ruhrgas in the plant of Hibernia at Herne, Germany, during 1930 - 1943. The design of the plant was based largely on theoretical considerations developed by Dr. Wilhelm Gumz but the process has been referred to occasionally as the Demag Process. The plant comprised two vertical reaction chambers each having an inside diameter of 1.2 meters and height of approximately 14 meters. The mixture of powdered coal and gasifying agent was passed upward through the first chamber and down through the second. Most runs were made with air steam mixtures as the gasifying agent. A few runs were made with air enriched with oxygen but none with air replaced by oxygen. Only moderate preheating of the gasifying agent was used (600°C. maximum) and conversion of carbon was used throughout the program and trouble was always experienced due to the accumulation of slag in the first reactor. The process was not regarded as ready for commercial use and no proposals for commercial units were made. Nearly all original experimental data are available.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1305

UNCLASSIFIED

THE SCHMALFELDT PROCESS FOR MAKING SYNTHESIS GAS FROM METHANE. Reported by: Harold V. Atwell. 23p. This report is a translation of a document by Hans Schmalfeldt dated March 29, 1947, describing work done in the plant of Klocknerwerke, A. G., Castrop-Rauxel, Germany, on the production of synthesis gas from methane containing gases by non catalytic reaction with steam and oxygen. In a pilot plant built in 1931, coke oven gas was converted under a pressure of 23 - 24 atm. abs. with air enriched to 33 per cent oxygen. Methane in the exit gas was less than 1 per cent and no soot formation was observed. The maintenance of the refractory lining proved quite difficult. A larger plant, started in 1938, could not be operated until 1941, because of difficulties in getting materials, particularly refractory brick. Results are not entirely satisfactory because of inadequate heat recovery and the lack of facilities for purging unreacted gas between cycles. Fischer-Tropsch residue gas and coke oven gas were converted at a pressure of 8 - 9 atm. abs. with an oxygen consumption 30 - 40 per cent above theoretical and with only slight formation of soot.

Item No. 22

FIAT REPORT NO. 1306

UNCLASSIFIED

PRODUCTION METHODS OF WALL BOARD AND WOOD - SUBSTITUTE. Reported by: Christopher C. Crusius. 19p. The technical data concerning the production methods of special wall-boards or fibre material to be used as substitute for a light weight wood of high tensile and compressive strength was collected at the J. M. Voith Works in Heidenheim, Wuerttemberg, Germany.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1307

UNCLASSIFIED

MANUFACTURE OF OXALIC ACID. Reported by: H. H. Hopkins. 10p. This report describes the manufacture of oxalic acid, as conducted by Rudolph Koepp & Co. at Oestrich near Rudesheim. The formate from producer gas, sodium sulphate and lime followed by conversion into calcium oxalate and purification of the free oxalic acid. In addition, what little information could be secured about the I. G. process is described. This process is based upon the nitric acid oxidation of carbo hydrates. A plant operated by the I. G. at Bitterfeld, Russian Zone, converted sugar by this process; but could not be visited.

Item No. 22

FIAT REPORT NO. 1308

UNCLASSIFIED

PROCESS FOR THE MANUFACTURE OF BETA-OXYNAPHTHOIC ACID, SODIUM SALT. Reported by: A. Stanley Fromholz. 10p. The purpose of this investigation was to obtain details of the process for the manufacture of beta-oxynaphthoic acid at the Offenbach plant of the I. G. Farbenindustrie. A plant with a capacity of approximately 150 pounds per hour for the manufacture of beta-oxynaphthoic acid (sodium salt) constitutes part of the manufacturing facilities at Offenbach. The plant is completely intact despite bombing or adjacent areas and was in operation at the time of the investigation.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1309

UNCLASSIFIED

THE MANUFACTURE OF HELIOGEN BLUE B AND PHTHALODINITRILE AT I. G. FARBENINDUSTRIE PLANT AT LUDWIGSHAFEN. Reported by: A. Stanley Fromholz. 15p. The purpose of the investigation was to obtain details of the process for the manufacture of phthalodinitrile. The I. G. Farbenindustrie plant at Ludwigshafen has in operation a very simple process for the manufacture of phthalodinitrile. This is an intermediate used in the manufacture of Heliogen Blue B at the same plant, which is reported on separately.

Item No. 22

FIAT REPORT NO. 1310

UNCLASSIFIED

EXPERIMENTAL STUDY OF A CONTINUOUS BUCHER PROCESS FOR THE PRODUCTION OF SODIUM CYANIDE. Reported by: A. Stanley Fromholz. 6p. An investigation was made of the activities of the Degussa organization in their attempt to reduce the Bucher cyanide process to a continuous basis. This gave promise of yielding a process competitive with existing processes for the manufacture of sodium cyanide.

Item No. 22

FIAT REPORT NO. 1311

UNCLASSIFIED

THE MANUFACTURE OF ETHYLENE GLYCOL, POLYGLYCOLS, GLYCOL ETHERS, ETHYLENE CYANHYDRIN AND ACRYLONITRILE, PHENYL ETHYL ALCOHOL AND RELATED DERIVATIVES OF ETHYLENE OXIDE IN GERMANY. Reported by: John D. Brandner and R. Max Goepf, Jr. 76p. The report describes German manufacturing processes for a number of derivatives of ethylene oxide, namely, ethylene glycol, polyglycols, polyethylene oxide waxes, glycol ethers, phenyl ethyl alcohol, ethylene cyanhydrin and acrylonitrile. Research work on synthetic lubricating oils from ethylene oxide and on higher alkylene oxides is also discussed. The translation of a detailed report concerning the explosion hazard of reacting ethylene oxide with a wide variety of chemical compounds is included.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1312

UNCLASSIFIED

MATERIALS, TECHNIQUES, AND TESTING METHODS FOR THE SANITATION (BACTERIAL DECONTAMINATION) OF SMALL-SCALE WATER SUPPLIES IN THE FIELD USED IN GERMANY DURING AND AFTER THE WAR. Reported by: Dr. Alexander Goetz. 13p. Methods developed in Germany during the war for water filtration by means of expendable filter agents ("Anschwemmfilter") which remove suspended matter, iron and micro-organisms, etc., in one and the same operational phase. In contrast to the diatomaceous earth filter powders, these materials represent "mixtures" of cellulose pulp, diatomaceous earth, and coagulants incorporated into the latter, which also produce coherence of the filter cake and adhesion of the cake on the filter screen. II. The practical application and methods of using heavy metals (in particular, silver) for the sanitation of polluted waters-"Micropur" of the Katadyn G.m.b.H. Deviating entirely from the customary electro-chemical application of Ag to water, this method has been developed during the war, particularly for very small ambulant units (1-10 liters) in batch treatment, in order to provide field personnel with reliable sanitary drinking water with a minimum of weight and bulk of equipment and supplies required. III. The use of nitrocellulose filter membranes of remarkably uniform controlled pore sizes for the simple and rapid recognition and quantitative determination of E. Coli and water-borne pathogenic bacteria. Specially designed apparatus for the routine use of this method permits the quantitative retention (and concentration) of the organisms from large quantities of liquids upon small surface areas. Techniques are described which have been developed in Germany (and Russia) for culturing these organisms upon these membranes and also for differential staining in situ, permitting easy counting techniques, and thus representing a substantial saving of manipulation, necessary glassware, and of total time required. It is possible to culture differentially from the same membrane.

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1313 (Volume I)

UNCLASSIFIED

GERMAN DYESTUFFS AND DYESTUFF INTERMEDIATES, INCLUDING MANUFACTURING PROCESSES, PLANT DESIGN, AND RESEARCH DATA VOLUME I. DYESTUFF INTERMEDIATE PROCESSES AND ANALYTICAL PROCEDURES. Reported by: D. B. Andrews, P. Kronowitt, F. W. Peck, S. S. Rossander, A. Siegel, O. Stallman, H. I. Stryker, W. A. Von Schlieben, and W. V. Wirth. 529p. This report comprises three volumes, describing many processes for the manufacture of dyestuffs and dyestuff intermediates developed by the German industry, including design data on unusual equipment. It also presents analytical procedures, and a review of dyestuff research covering the period subsequent to 1938. In general, previously reported information in BIOS, FIAT and other reference reports relative to dyestuffs and intermediates is avoided, although supplementary data are given.

Item No. 22

FIAT REPORT NO. 1313 (Volume II)

UNCLASSIFIED

VOLUME II. DYESTUFF PROCESSES AND ENGINEERING DATA. Reported by: D. B. Andrews, P. Kronowitt, F. W. Peck, S. S. Rossander, A. Siegel, O. Stallmann, H. I. Stryker, W. A. Von Schlieben and W. V. Wirth. 414p. This report comprises three volumes, describing many processes for the manufacture of dyestuffs and dyestuff intermediates developed by the German industry, including design data on unusual equipment. It also presents analytical procedures, and a review of dyestuff research covering the period subsequent to 1938. In general, previously reported information in BIOS, FIAT, and other reference reports relative to dyestuffs and intermediates is avoided, although supplementary data are given.

FIAT ITEM NO. 22

MISCELLANEOUS CHEMICALS AND MATERIAL SUBJECTS

Item No. 22

FIAT REPORT NO. 1314

UNCLASSIFIED

THE PREPARATION OF 2-METHYL-5-ETHYLPYRIDINE FROM VINYL ETHER. Reported by: . F. Anzilotti. 7p.

2-Methyl-5-ethylpyridine is prepared in 90-95% yield from methyl vinyl ether and ammonia over a titanium phosphate catalyst at 200-220° C. and 220 atmospheres pressure. A laboratory continuous process and catalyst study is described and flow sheet is appended.

MEDICAL

Item No. 24

FIAT REPORT NO. 71

UNCLASSIFIED

MEDICAL TARGETS IN CENTRAL AND SOUTHERN GERMANY. Reported by: J. A. Leighty and R. J. Fossbinder. 97p.

Survey of production at the following medical and pharmaceutical plants: Corpus Sanum Julius Redel, Baden-Baden; H. Finzelberg's Nachfolger, Andernach a./Rhein; Heinrich Mack, Nachf., An; Luipold-Werk; Ludwig Heumann & Co., Nürnberg; Sandoz A.G., Nürnberg; C. H. Boehringer, Sohn, Ingelheim a./Rhein; Dimalt A.G., Munich-Allach; C. F. Boehringer & Söhne G.m.b.H., Mannheim; Atmos Gesellschaft, Mannheim. Chief products manufactured are listed and described. Some manufacturing processes are given in detail. German and foreign patents, if any, held by companies are listed. Research projects undertaken are summarized. Statistics of production and stocks are tabulated. Appendix I and II are reports by Dr. Rabald on the synthesis of theophylline, theobromine and caffeine.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 72

UNCLASSIFIED

GERMAN SURGICAL INSTRUMENT MANUFACTURING IN THE SOLINGEN AND TUTTLINGEN DISTRICTS. Reported by: C. B. Jones.
17p.

This report consists of a general summary of the industry and accounts of production at individual plants visited. The prewar quality of German surgical instruments was largely due, the author believes, to the skilled craftsmanship of the workmen, many of whom have migrated to the U.S. Instruments dealt with are surgical scissors, forceps, tweezers, plastic shears, pliers, bone chisels, needle holders, and cutting instruments. During the war German instruments were made of a straight carbon (0.50-0.60%) steel and then nickel plated. American military services consider this type of material for surgical instruments obsolete. German operations in making surgical instruments are described and compared with American practices to which they are similar. Operations include forging, trimming, rough grinding, machining, assembling, heat treating, finishing grinding, polishing, final polishing and inspection.

MEDICAL

Item No. 24

FIAT REPORT NO. 79

UNCLASSIFIED

RESEARCH ACTIVITIES OF THE KAISER WILHELM MEDICAL RESEARCH
INSTITUTE AT HEIDELBERG. Reported by: R. A. Dutcher.

7p.

This report contains information on the following research projects undertaken at this institute; Vitamin E; fortification of oleomargarine; cheese quality; antiseptic compounds; beverage from mountain ash berries; method for preparing riboflavin from milk whey. It was found that rats receiving a diet containing protein of poor biological value showed evidence of liver injury. Kuhn reported that Vitamin E therapy had been successful in a number of cases. Experiments on cheese quality suggest future studies on other vitamins. An outgrowth of work on anti-biotic substances was the discovery of the bacteriocidal properties possessed by bromo-hydroxybenzl derivatives. A new beverage not unlike lemon juice was made from mountain ash berries. Method of preparing riboflavin from whey is less expensive and eliminates use of obnoxious pyridine.

MEDICAL

Item No. 24

FIAT REPORT NO. 158

UNCLASSIFIED

INVESTIGATION OF PROSTHESES AS RELATED TO THIGH AMPUTATIONS.
Reported by: R. P. Schwartz. 8p.

This report summarizes the results of U. S. investigations of two German designs of prosthetic devices for thigh amputees. One is mass produced except for bucket, adjusted for length, bilateral, requires no harness, functionally efficient. The other, a hydraulic mechanism, significantly advances the possibility of more normal function. No diagrams included. Bibliography.

Item No. 24

FIAT REPORT NO. 169

UNCLASSIFIED

MANUFACTURE OF SURGICAL DRESSINGS AND ALLIED PRODUCTS AT PAUL HARTMANN CO., HEIDENHEIM. Reported by: W. Eustis. 19p.

This report describes history, ownership, management and operations of the largest and best manufacturer of surgical dressings in Germany. Foreign sales agents and representatives, principal foreign customers, foreign patents and production for foreign consumption and export are outlined. Equipment and processes in bleaching, drying, carding, dressing, knitting, packaging, and adhesive departments are described. In addition to its own products, this concern carried, as a jobber, additional items. Photographs and catalogues referred to in report have been forwarded to Lt. Col. Stephen J. Kennedy, Office of Quartermaster General, Military Planning Division, Washington, D. C. For another report on this subject. see PB 2448, p.274.

MEDICAL

Item No. 24

FIAT REPORT NO. 285

UNCLASSIFIED

INSPECTION OF GERMAN DENTAL BUR MANUFACTURERS. Reported by: K. H. Strader. 15p.

Details of processes used by three German dental bur manufacturers are contained in this report. They are Busch & Co. and Emil Lange & Co., Engelskirchen and Hager & Meisinger, Dusseldorf. An attempt was made to inspect Jota-Werke Gebr-Funke of Dusseldorf. The three plants all use the same brand and make of steel, Silber-Stahl Chrome-Vanadium, and Swiss type lathes or simple modifications thereof for preforming. In all cases cross cutting was performed before cutting blades and on similar equipment. Automatic feed is used entirely on blade cutting equipment, (Hauser most popular) and all work is completely cut in one machine. The most ingenious method of removing tangs and fins turned during ring and flat forming was found at Hager and Meisinger. All plants use 50% neutral salt, 50% cyanide for hardening and all draw in oil for very short periods and at different intervals for different head and neck diameters. Polishing is done on very satisfactory equipment at both Busch and Hager & Meisinger. Efficiency claimed ranges between 95% and 98%.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

UNCLASSIFIED

FIAT REPORT NO. 590

UTILITY OF DIBROMSALICIL: ALSO STREPTOBACTERIUM PLANTARUM STRAIN 10-S. Reported by: L. A. Monroe and F. O. Robitschek. 2p.

This brief report describes the result of a second visit to Dr. Kuhn in Germany. Uncompleted tests on mice and guinea pigs indicate that dibromosalicil is effective against diphtheria, dysentery, and Rocky Mountain spotted fever. The formula for a culture medium for Streptobacterium plantarum strain 10-S as used in Dr. Kuhn's laboratory is given.

Item No. 24

FIAT REPORT NO. 742

UNCLASSIFIED

SURGICAL INSTRUMENT INDUSTRY IN TUTTLINGEN, GERMANY. Refer to Item No. 9 for a complete listing of this report.

MEDICAL

Item No. 24

FIAT REPORT NO. 779

UNCLASSIFIED

WORK ON PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND ON ELECTROPHYSIOLOGY. Reported by: H. Schaefer. 35p.

This report presents a summary of the work done by the Department of Experimental Pathology and Therapy of the W. G. Kerckhoff-Institute, Bad Nauheim, since 1 January 1940, with particular attention to unpublished work. The following subjects are discussed: (1) New apparatus: an amplifier of 10^6 power a time ordinate recorder, respiration recorder, etc.; (2-4) Electrophysiology of the circulatory system; description of experiments in connection with the theory of the electrocardiogram with microelectrodes, and of observations on the sensory heart nerves, and discussion of heart reflexes and sensibility as disease factors; (5-6) The role of anoxia on peripheral motor nerves, as well as the pharmacological influencing of resistance against altitude through

membrane poisons (calcium, yohimbine) were studied and detonation-death experimentally explained; (7) The mechanism of tetanus is explored; (8) The kinetics of choline-esterase of blood are demonstrated; (9) Several experiments on muscles are described; (10) It is shown that intravenous oxygen therapy is purposeless from a quantitative point of view; (11-13) Applied circulation studies: this consists of work on the influence of digitalis and strophanthin on coronary bloodflow, pathological physiology of heat and burning (where histamine is excluded as cause of collapse, and the use of narcosis as therapy is emphasized), and new testing methods for circulatory-system drugs; (14) Work on physiology of the senses: testing of influence of drugs on the visual threshold of man and on the electroretinograms of animals. A new stereo-effect is described. Diagrams, graphs, and bibliography are included. In German.

MEDICAL

Item No. 24

FIAT REPORT NO. 868

UNCLASSIFIED

TRYP AFLAVINE, SURFEN, P. 60, AND BOVOFLAVINE. Reported by:
W. M. Swangard. 17p.

The manufacture of four substances - trypaflavine, surfen A, P. 60, and bovoflavine - is described. Trypaflavine is a neutral mixture of 3-6-diamino-10-methylacridinium-chloride and 3-6-diamino-acridinechlorhydrate, and is made extensively in the United States. The significant information is the German method of processing the monochlorhydrates. Surfen A is a recently developed surface bactericidal agent with considerable depth efficiency. It is water soluble and nontoxic to mucous membranes. P. 60 is a new ointment base constituent of low melting point, and is water soluble. Bovoflavine is a specific pharmaceutical ointment containing all three previously mentioned drugs, and is used in mucous infections, dermatitis, and specifically in bovine trichomoniasis. P. 60 is a polymerized ethylene oxide which results from the reaction of one mol of water with approximately 60 mols ethylene oxide; it is made at the Ludwigs-hafen plant of I. G. Farbenindustrie. The other substances are made only at Höchst. Figure 1 is a constituent chemicals list for the manufacture of trypaflavine; figure 2 is a flow sheet for the manufacture of trypaflavine.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 884

UNCLASSIFIED

BIOPHYSICS WITH SPECIAL REFERENCE TO ELECTROBIOLOGY. Reported by: R. T. Lustig. 98p.

This report reviews German development in ultra short wave therapy and research in dielectric constants and specific resistance of animal and human tissue. Sensitive detectors in the field of infra red, visible light, ultra-violet, X-ray, and radio activity are described and photostatically illustrated. A new instrument for erythrocyte determinations is described. Several devices of interest to the biophysicist are referred to in this report and instruction as to where they may be obtained is included.

Item No. 24

FIAT REPORT NO. 896

UNCLASSIFIED

ALUDRINE SULFATE, MANUFACTURE AND PHARMACOLOGICAL PROPERTIES. Refer to Item No. 22 for a complete listing of this report.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 900

UNCLASSIFIED

THE WALDMANN VACCINE (AGAINST APHTOUS STOMATITIS). Reported by: W. M. Swangard. 38p.
This report deals with the essentials of the original Waldmann and the later Behring Werke (Marburg) process for the production of a live virus preventative vaccine against aphtous stomatitis (foot and mouth disease). Details are given in the steps of production and preparation of virus, chemical controls, biological typing, and tests for pathogenicity and antigenicity. Appendixes 1-5 list personnel interviewed, targets visited, and bibliography, give building plans of the proposed Behring plant, and Dr. Waldmann's original report in German.

Item No. 24

FIAT REPORT NO. 912

UNCLASSIFIED

THE MANUFACTURE OF BILE ACIDS FROM OX BILE. Refer to Item No. 22 for a complete listing of this report.

Item No. 24

FIAT REPORT NO. 991

UNCLASSIFIED

DUSTY LUNG CONDITIONS IN THE MANUFACTURE OF PYROTECHNIC ALUMINUM BRONZE POWDER. Reported by: F. C. Frary. 10p.
A study was made covering plant conditions and practices during the war, in two aluminum bronze powder plants producing stamped pyrotechnic ("pyro") powder, to determine their relationship to the occurrence of lung injuries in workmen in this industry. The machinery appeared to be in reasonably good condition, but carelessness on the part of new workmen and their general inferior state of health and nutrition may have contributed to the injuries. The change from a mixture of stearine and stearic acid, as a lubricant in the stamping process, to an "artificial vaseline" may also be involved. The medical and pathological aspects of the problem are being investigated by Capt. M.C.S. Kennedy, under the auspices of FIAT (British). Appendix I gives a list of German personnel interviewed, Appendix II a list of German targets visited, and Appendix III a bibliography.

MEDICAL

Item No. 24

FIAT REPORT NO. 996

UNCLASSIFIED

THE COMMERCIAL DEVELOPMENT AND MANUFACTURE OF SYNTHETIC HORMONES IN GERMANY. Reported by: C. R. Addinall. 180p. The technical development of the synthesis of the estrogenic, androgenic, and adrenal cortical hormones and of the manufacturing processes employed in Germany for their commercial production from cholesterol and stigmasterol are reviewed. Procedures for the preparation of testosterone and progesterone from dehydroandrosterone, for the conversion of hydroxy-etiocholenic acid to desoxycorticosterone, for the transformation of acetoxybisanorcholenic acid to progesterone and desoxycorticosterone, and for the reduction of estrone to estriol are described and charted. Full manufacturing details of the Schering A. G. processes for the synthesis of hormones from cholesterol and of the Schering and I. G. Farbenindustrie processes for the synthesis of progesterone from phytosterol are discussed. The original German directions for production are given in an appendix. They deal with (A) the oxidation of cholesterol, (B) the synthesis of testoviron, (C) the preparation of "Proluton" (progesterone from dehydroandrosterone acetate), (D) the preparation of "Proluton C" (pregnenin-ol) from trans-dehydroandrosterone acetate, (E) the preparation of estradiol from cholesterol, (F) the production of 3-acetoxy-etio-cholenic acid from the crude acids, (G) the production of "Cortiron" (desoxycorticosterone acetate) from 3-acetoxy-etiocholenic acid, (H) the preparation of progesterone from soyphytosterol, (J) the testing of acetic acid used in the production of hormones, and (K) the production of "Lutren" (progesterone). In Appendix II a transcript of an Austrian Patent Application of the Schering A. G. in Berlin is given, regarding the procedure for preparation of compounds of the cyclopentano-polyhydrophenanthrene series. Four patents and patent application relating to the Inhoffen aromatization process are mentioned in Appendix III, and a bibliography on related reports and relevant German publications is given in Appendix IV.

MEDICAL

Item No. 24

FIAT REPORT NO. 1004

UNCLASSIFIED

IDENTIFICATION OF BIOLOGICAL STAINS AND INDICATORS MANUFACTURED BY I. G. FARBENINDUSTRIE, A. G. Refer to Item No. 22 for a complete listing of this report.

Item No. 24

FIAT REPORT NO. 1014

UNCLASSIFIED

MISCELLANEOUS PHARMACEUTICALS AND PHARMACEUTICAL INTERMEDIATES, MANUFACTURED AT I.G. FARBENINDUSTRIE A.G., ELBERFELD. Reported by: J. G. Kern. 80p.

Processes were obtained for eleven pharmaceuticals and as many more underlying intermediates. These processes are of interest not only for themselves but because of special procedures used and certain reactions carried out which have general value as novel methods of chemical synthesis, they are presented in full detail. Appendix 3 contains manufacturing processes for 26 pharmaceuticals and pharmaceutical intermediates (in German).

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 1022

UNCLASSIFIED

REPORT ON OCCUPATIONAL DISEASES RELATED TO THE MANUFACTURE OF BENZIDINE AT I.G. FARBENINDUSTRIE. A.G., LEVERKUSEN.

Reported by: J. G. Kern. 11p.

The incidence of bladder tumor caused by aromatic amines, methods adopted for prevention of its incidence, and clinical methods of observation of workers were discussed with supervisory personnel in the operating department at the Leverkusen plant of I.G. Farbenindustrie A.G. A method of determining aromatic bases in urine and a statistical study of personnel working in the benzidine factory are presented. A statistical study of incidence of bladder tumor among benzidine workers, made by Dr. Ludwig, Director of "A Fabrik" Primary Intermediates, and Dr. Eichler, Supervisor, benzidine and associated operations, in the Leverkusen plant is also given. Appendices present: (1) Personnel interviewed, and not interviewed but referred to in report; and (2) report used as reference before the field investigation.

Item No. 24

FIAT REPORT NO. 1097

UNCLASSIFIED

THE STATISTICAL DISTRIBUTION OF ERYTHROCYTES IN THE COUNTING CHAMBER. Refer to Item No. 9 for a complete listing of this report.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 1100

UNCLASSIFIED

ADVANCES IN THE BYOCHEMISTRY OF THE CORYNEBACTERIUM DIPHTHERIA GROUP, WITH SPECIAL REFERENCE TO THE PATHOLOGICAL PHYSIOLOGY OF DIPHTHERIA IN MAN. Reported by: G. Tarnowski. 139p.

A review is presented of the problem of chemical composition of diphtheria bacilli, their metabolism, their toxin-production, and the action of this toxin on the organism, with reference to the published work of the last 20 years in this field, as well as to the original work of the author. The reference material is critically discussed, based on the original work and experiences of the author. In German, with an abstract and biographical note on the author in English.

Item No. 24

FIAT REPORT NO. 1174

UNCLASSIFIED

SALT AND ESTERASE CONCENTRATION IN THE BLOOD IN RELATION TO ALTITUDE RESISTANCE. Reported by: H. Goebel and H. Schaefer. 7p.

The potassium and calcium contents and the quotient of the plasma have no influence on the physiological altitude resistance of the human body. Nor does the concentration of blood cholinesterase show any relation to it. There is only a relation between blood pressure and the Ca contents in ascension experiments. In German.

Item No. 24

FIAT REPORT NO. 1176

UNCLASSIFIED

A NEW STEREOSCOPIC EFFECT AND ITS PHYSIOLOGICAL INTERPRETATION. Refer to Item No. 9 for a complete listing of this report.

MEDICAL

Item No. 24

FIAT REPORT NO. 1185

UNCLASSIFIED

RECENT GERMAN DEVELOPMENTS IN THE FIELD OF DENTAL RESINS.

Reported by: L. M. Blumenthal. 13p.

The report covers recent German developments in the field of dental resins. The composition and preparation of a new self-hardening (rapidly hardening) resin are described. The significance of the new material (methacrylate resin containing benzoyl peroxide and n-trihexyl amine) lies in the ease of application, particularly as far as the filling of cavities is concerned. Replacement of metal with plastic for all dental applications is desirable, because the presence of metal fillings, etc., in the mouth results in the forma-

tion of electric couples. In consequence thereof, the tooth becomes sensitive and electrolysis accompanied by corrosion and discoloration occurs. Lists of German personnel interviewed; targets visited; bibliography; tables are appended.

Item No. 24

FIAT REPORT NO. 1202

UNCLASSIFIED

BACTERICIDAL AND FUNGICIDAL PROPERTIES OF NATURAL SUBSTANCES.

Reported by: Dr. Willi Rudolph. 17p. This report is a summary of those works, which were published concerning natural bactericidal and fungicidal properties. Natural bactericidal properties and natural fungicidal properties are discussed.

MEDICAL

Item No. 24

FIAT REPORT NO. 1268

UNCLASSIFIED

PHYSIOLOGY OF LIVER. Reported by: Kurt Felix. 26p. The physiological functions of the liver resulting from its position in the circulatory system are discussed, as well as chemical reactions which are involved. As pointed out, the liver is provided from the intestine and other organs with both useful substances and waste products. The first are utilized and distribute to the peripheric organs. The waste products are prepared for excretion. Some substances such as industrial agents, medicines and products of decay or pollution, affect the liver more or less unfavorably.

Item No. 24

FIAT REPORT NO. 1280

UNCLASSIFIED

USEFUL STRYCHNINE DERIVATIVES AND THEIR THERAPY. Reported by: Hans-Joachim Teuber. 12p. A report is given concerning strychnine derivatives, examined pharmacologically in Germany, and also of those therapeutically used. Some chemically known but pharmacologically not as yet tested substances are also mentioned.

Item No. 24

FIAT REPORT NO. 1282

UNCLASSIFIED

I. NEW SULFA DRUGS: (DEBBNAL & MARBADAL) II. CLINICAL EXPERIENCE WITH "DE-MA" AND OTHER SULFONAMIDE POWDER MIXTURES (AT THE BUERGER HOSPITAL IN FRANKFURT). Reported by: Jobst Von Der Groeben and L. M. Blumenthal. 23p. This is a study of the clinical and experimental results that were accomplished by six German authors with a new sulfonamide mixture that consists of Debenal M (Sulfamerazine) and Marbadal. This drug is said to be the most powerful chemotherapeutical agent besides Penicillin.

FIAT ITEM NO. 24

MEDICAL

Item No. 24

FIAT REPORT NO. 1283

UNCLASSIFIED

THE DUODENUM CONTORTUM (AN ANOMALY NOT DESCRIBED BEFORE). Reported by: Charles F. W. Nordwig, M.D. 6p. A case report is given. Three figures are given.

Item No. 24

FIAT REPORT NO. 1285

UNCLASSIFIED

TISSUE CULTIVATION AND CANCER RESEARCH SINCE 1938. Reported by: Dr. Carl Dittmar. 13p. A survey of recent literature is given on the cultivation of carcinoma tissue under the influence of amino acids, of vitamins, of bacterial extracts, of bacteriophages and in hypertonic medium. The possible effect of adrenalin as regulator of normal growth and experiments with colchicine, tryptaflavine, narcotics and carcinogenic hydrocarbons in their effect on carcinoma are discussed.

Item No. 24

FIAT REPORT NO. 1289

UNCLASSIFIED

PRINCIPAL AND TECHNICAL FACTS CONCERNING PLASTIC ARM SURGERY AFTER KRUKENBERG. Reported by: K. H. Bauer and M. Schwaiger. 34p. Report gives the English translation, illustrations, and the original German manuscript.

AIRCRAFT

Item No. 25

FIAT REPORT NO. 100

UNCLASSIFIED

GERMAN AIRFRAME TOOLING - GENERAL. Reported by: R. G. Bowen. 10p.

This report consists of two separate parts: information on airframe master tooling practice at the Dornier-Werke; a description of a Messerschmidt profiling machine. It was found from documents and from interrogation of Dr. A. Spiess that airframe tooling practice at Dornier was in strict accord with that of Messerschmitt firm. Documents obtained included a complete set of 94 production illustrations in water color of the components. Profile milling machine known as Kapiersfräsmachine, located in one of Oberammergau wood working shops, is of Messerschmidt design. Its primary function is to directly produce on a block of material, such as obholz, the exact contours as may exist on a metal draft. The engineering draft, representing regularly spaced mold lines, is attached to the machine in a vertical plane and moves in the same plane, speed and direction as the work surface above. These lines are optically translated, magnification of $7\frac{1}{2}$, on to a frosted glass window. Operator then rotates block 90° and changes to a companion draft, thus providing the cutting media for this right angle shift of block. Finished block has parallel grooves. Appendices contain $3/4$ perspective and 3 view drawings, operational diagram of machine, and photographs of block.

FIAT ITEM NO. 25

AIRCRAFT

Item No. 25

FIAT REPORT NO. 176

UNCLASSIFIED

FOCKE-ACHGELIS ROTARY WING KITE (DIVISION OF WESER FLUGZEUGWERKE). Reported by: H. E. Wihmiller and H. P. Meiners. 12p.

The FA-330 is a three-bladed rotating wing type kite operating on the autogiro principle and providing an elevated observation platform for one man. The model described in this report was made for towing from a submarine deck to which it is attached by a steel cable working from a winch on the submarine. Photographs and drawings are appended.

Item No. 25

FIAT REPORT NO. 177

UNCLASSIFIED

HELICOPTER THEORY; INTERVIEW WITH DR. KURT HOHENEMSER CONCERNING HIS RECENT CONTRIBUTIONS. Reported by: B. Kelley and H. J. Mulvey. 6p.

Dr. Hohenemser has been close to German helicopter development programs throughout the war. He has been associated with the firm of Anton Flettner and most of his energy has gone into the development of the FL 282 intermeshing rotor machine known as the "Kolibri." The present report summarizes nine articles by him on helicopter theory which have been published by the German government under the heading of the Flettner firm.

FIAT ITEM NO. 25

AIRCRAFT

Item No. 25

FIAT REPORT NO. 178

UNCLASSIFIED

FA 223 HELICOPTER; INTERVIEW WITH PROF. FOCKE AND INSPECTION OF MACHINE. Reported by: B. Kelley and H. J. Mulvey.
13p.

The FA 223 helicopter has two rotors side by side, and considerable tail surfaces. Gross weight varies from 8,150 to 11,000 lbs. Only 10 machines were actually flown, the maximum time on any one ship being about 100 hours. Examination of one machine which is still flyable has been made, and this report describes briefly specifications, rotor blades, controls, engine installation, and landing gear. Four diagrammatic sketches.

Item No. 25

FIAT REPORT NO. 240

UNCLASSIFIED

ITALIAN AIRCRAFT DEVELOPMENTS. Reported by: J. V. Foa.
15p.

This report is based upon information obtained during a visit to the Engineering Department of FIAT Airplane Division in Turin. The Italian aircraft industry was under control of politicians or their proteges in the last years of the fascist regime, while after armistice day most technical personnel refused to work for the Germans. Thus airplane design is now at least five years behind, and nothing worth mentioning could be found in this field. Brief account is given of research work in the fields of aerodynamics and jet propulsion. A list of papers by Italian technicians which have been removed to A.D.R.C. in London is given. (Pages 3 and 4 are missing from this copy.)

FIAT ITEM NO. 25

AIRCRAFT

Item No. 25

FIAT REPORT NO. 417

UNCLASSIFIED

PRESS-WELDING" ALUMINUM FOR AIRCRAFT RADIATORS. Reported by: T. G. Haertel. 11p.

Report of a visit and interview of personnel of the Adam Opel Automobile Factory, Russelsheim, Germany (near Frankfurt) on September 28 and October 4, 1945. The principal information was received from Herman Broesen, in charge of the tool and die design and press shop, who arranged for the preparation of an illustrated operation sheet concerning a novel "press-welding" of aluminum sheets. Sheets of aluminum were virtually melted together between gas heated dies closed under pressure. While the dies were nearly closed, compressed air was injected between the sheets to blow open the areas between the rows of welds, in order to form passage ways conforming to the design of the dies. The pieces were hand welded together to produce Ju87 and Ju88 aircraft radiators. Undoubtedly the "press-welding" of aluminum has many other possible applications outside of radiator manufacturing. Report indicates where additional information maybe found. Report contains a schematic drawing of gas fired dies, and a photograph showing hand welding and finished products.

Item No. 25

FIAT REPORT NO. 446

UNCLASSIFIED

PLASTIC AND WOOD FOR AIRCRAFT TOOLING AND FABRICATION. Refer to Item No. 22 for a complete listing of this report.

Item No. 25

FIAT REPORT NO. 604

UNCLASSIFIED

THE HELICOPTER ANTENNA. Refer to Item No. 9 for a complete listing of this report.

FIAT ITEM NO. 25

AIRCRAFT

Item No. 25

FIAT REPORT NO. 1055

UNCLASSIFIED

MISCELLANEOUS GERMAN AERONAUTICAL DEVELOPMENTS. Reported by: R. P. Buschmann and E. F. Kroner. 64p.

This report presents data obtained from German professors at Technische Hochschule Darmstadt and Munich, engineers at Bayerische Motoren Werke, and through interrogations of Willy Messerschmitt and other aeronautical experts. Matters pertaining to jet and rocket engines, as well as other aeronautical subjects were discussed. Sketches and technical data are included.

Item No. 25

FIAT REPORT NO. 1064

UNCLASSIFIED

RESEARCH ON ATMOSPHERIC MOVEMENTS BY USE OF GLIDERS. Refer to Item No. 22 for a complete listing of this report.

Item No. 25

FIAT REPORT NO. 1065

UNCLASSIFIED

SUN RADIATION MEASUREMENTS MADE WITH AN AIRPLANE AT ALTITUDES UP TO NINE KILOMETERS. Refer to Item No. 22 for a complete listing of this report.

Item No. 25

FIAT REPORT NO. 1066

UNCLASSIFIED

MEASUREMENT OF ATMOSPHERIC ELECTRICITY BY MEANS OF GLIDERS. Refer to Item No. 9 for a complete listing of this report.

AIRCRAFT

Item No. 25

FIAT REPORT NO. 1087

UNCLASSIFIED

REDUCTION OF AIRFOIL RESISTANCE BY USE OF "DRAWN-IN PROFILES.
Reported by: E. V. Lossl. 6p.

The variation of frictional force on the surface of an airfoil or other streamlined body depends on the so-called "boundary layer", increasing as the latter decreases in thickness, and especially as it changes from laminar to turbulent. The production of a turbulent boundary layer can be prevented or interfered with in several ways. One of these is to introduce a local change in the airfoil profile to give an increase in the pressure in the surrounding stream in the region where the transition from laminar to turbulent would otherwise occur. Theoretical and experimental results of this method of reducing frictional drag are presented. A bibliography, drawings, and tables of data are included. In German.

Item No. 25

FIAT REPORT NO. 1106

UNCLASSIFIED

STABILITY ABOUT THE VERTICAL AND LONGITUDINAL AXES OF AN AIRPLANE WITH SWEPT WINGS. Reported by: W. Eisenmann.

34p.

This report presents calculations for the stability about the vertical and longitudinal axes of an airplane similar to the Messerschmitt model Me 262 with (a) the wing swept forward at 45°, and (b) with wing swept back at 45°. The results are compared with the stability calculation for the actual Me 262. The calculations show that the stability coefficients are changed only slightly. However, with the swept-back wing they show an increase in the amplitudes of the rolling and yawing oscillations, especially at high altitudes and high lift coefficients. In these cases a strong tendency to "Dutch-Roll" has to be expected, which may be diminished by a decrease in the angle of dihedral. The resulting decrease in spiral stability is less annoying than the "Dutch-Roll". The airplane with the swept forward wing shows no faults for these particular stability considerations. Tables and charts are included. This report is in German.

FIAT ITEM NO. 25

AIRCRAFT

Item No. 25

FIAT REPORT NO. 1204

UNCLASSIFIED

MODERN AIR TRAFFIC CONTROL. Reported by: T. V. Hauteville.
35p.

This report deals with the application to civil use of methods of air traffic control and communication developed during the war for military purposes. A very good description is given of how present day equipment may be utilized to increase the safety and speed of air traffic. The text of this report is in German.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 102

UNCLASSIFIED

NEW RADIAL FLOW TURBINE DESIGN. Reported by: Wm. P. Spofford and M. L. Ireland, Jr. 9p.

This report contains a detailed description of a radial flow turbine produced by Wagner-Hochdruck Dampfturbinen, K.G. which has several novel features. This turbine is meant for destroyers with the following characteristics: per shaft, twin screw turbines - 46,000 S.H.P.; Diesels - 2x2000 S.H.P.; Speeds - 3180 H.P., 2820 L.P. and 360 shaft R.P.M.; Astern - 15350 S.H.P. at 250 shaft R.P.M., maximum tip speed 250 meters per second. Steam consumption stated to be 4-5% less than conventional design; weight 28-32% less. The H.P. rotor is in two separate parts each with an overhung wheel. Combined rotors and stator are located between two pinion helices with no physical connection between rotors. Rotors are in two pieces so as to provide the best materials for both rotor and pinion requirements. The L.P. rotor is one single built up unit operating in two bearings. Two-bearing design is used throughout for simple alignment. Drawings of destroyer arrangement of turbine are given. This firm also had begun the design of a stationary unit for 100,000 S.H.P. having a rotor of three meters diameter and four meters long over the bearings.

Item No. 26

FIAT REPORT NO. 115

UNCLASSIFIED

SURVEY OF THE CARBON BRUSH INDUSTRY FOR ELECTRICAL EQUIPMENT OF GERMANY. Refer to Item No. 22 for a complete listing of this report.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 291

UNCLASSIFIED

GAS TURBINE PROJECT FOR A SCHNELL BOAT DEVELOPED BY BLOHM & VOSS, HAMBURG. Reported by: M. L. Ireland. 8lp.

Detailed exposition of the design and projected use of hollow blades for a gas turbine for a Schnell boat was obtained in the interrogation of Herr Hermann Scheppler. The net power of the unit was to be 7500 hp with a gross turbine output of 20,000 hp. It was intended to fit this unit to the center shaft, and drive both outboard screws of the vessel with Diesels. The project was never completed but drawings and design details of the turbine and compressor, blading details for both elements, turbine nozzle and rotor details, and turbine efficiency and stress calculations were obtained and are included in the report. Many drawings with design data, diagrams, and thermodynamic and stress calculations in German are appended. Some drawings will reproduce poorly.

Item No. 26

FIAT REPORT NO. 418

UNCLASSIFIED

REPORT OF THE GRID MEETING IN BRAUNSCHWEIG, 27-28 MARCH, 1944. Refer to Item No. 5 for a complete listing of this report.

Item No. 26

FIAT REPORT NO. 441

UNCLASSIFIED

INVESTIGATION OF THE B.M.W. 003 TURBINE AND COMPRESSOR BLADING. Reported by: A. Planiol. 9p.

Interrogation of H. Hagen, design engineer, on the characteristics and testing of the blading of the B.M.W. turbine and axial flow compressor. Design details of the profiled ribs, and bucket and nozzle profiles are discussed. Illustrations are prints of rotor blade profiles.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 476

UNCLASSIFIED

INVESTIGATION OF DEEP WELL TURBINE SUBMERSIBLE PUMP MOTORS.
Reported by: F. J. Mcentee. 17p.

This investigation covers known manufacturers of submersible deep well turbine pump motors; these motors are practical and a reasonable life expectancy can be obtained by using materials developed by I.G. Farben for insulating the windings. Four types are listed, differing in the manner water has access to the motor, or in the canning or sealing of windings, or in the inversion of the unit with the motor above the pump. Six manufacturers are listed. Diagrams, drawings and performance data form the accompaniments.

Item No. 26

FIAT REPORT NO. 489

UNCLASSIFIED

SURVEY OF FANS AND TURBO BLOWERS. Reported by: R. D. Madison. 44p.

Comments regarding German practice may be summarized: 1. There has been little recent attention to the axial flow fan; 2. there was no general improvement in the centrifugal fan; 3. fans contained more blades; 4. more use was made of mixed flow inlets, backward curved blades, higher speeds, and steam turbine drives; and 5. there was little testing of fans for noise. As appendices there are lists of books and pamphlets and of persons interviewed as well as an article on "Axial flow fan tests, showing various arrangements of blades and vanes: J. H. Voith Co. Heidenheim, April 13, 1944". The article describes test curves, which are missing; the 39 figures mentioned are also lacking.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 509

UNCLASSIFIED

RECENT ENGINEERING DEVELOPMENTS IN SWITZERLAND ON GAS TURBINES AND STEAM GENERATORS. Reported by: H. J. Rose.

46p.

This report by the Solid Fuels Sub-committee discusses progress made in Switzerland in developing equipment for the more effective utilization of coal, particularly the use of coal for firing gas turbines. The firms visited were Brown-Boveri & Co. Ltd.; Escher Wyss Engineering Works, Ltd. and Sulzer Bros. Ltd. Design work is discussed on coal-fired gas turbines, turbine blade erosion from solid particles, Houdry process combustion gas turbines, Velox boiler plants and "aerodynamical turbines" a closed circuit turbine in which air is circulated under pressure, but combustion products do not pass through the turbine. Sulzer Bros. are working on a 7000 S.H.P. oil-fired marine combustion turbine of a closed circuit. Full reports of the visits to each firm are given with a list of their publications since 1939.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 525

UNCLASSIFIED

POPPET VALVES FOR AUTOMOTIVE AND AIRCRAFT ENGINES. Reported by: L. E. Bohue and N. Hoertz. 20p.

The majority of valves were produced in five German factories as follows: Alfred Teves Maschinen und Armaturenfabrik, A. G., Frankfurt-Main; Teveswerke Motorenteile und Hydraulic Aggregate, Berlin; Alfred Teves K. G., Golling, Austria; Bayerische Leichtmetallwerke, Munich; and Bohler K. G., Vienna. All aircraft valve production had been stopped for some time and likewise most of the equipment for producing them had been dismantled, removed or destroyed, and was not available for examination. Automotive valves are in production on a small scale and such equipment was investigated for new or novel designs or production methods. It can be said that no new design or materials were found. Generally speaking the production methods were very similar to practices followed in the United States. German valve producers made hollow head sodium filled valves by welding the top of the head to the valve body. This is somewhat different than regular practice in the United States and details are included in this report. Also considerable information on the valve steel specifications were gathered. No unusual steels were found. During the investigation of poppet valves test engines were discovered designed with a rotating plate for opening and closing the intake and exhaust ports instead of the conventional poppet valve. The engine was never produced on a production basis. Photographs of this engine are included in the report. During the war the German government, in order to get the best results for the limited supply of chromium, nickel, tungsten and vanadium available, had to maintain a very strict control over them. All steels suitable for valves contain one or more of these metals, and a certain group of alloys were set up as standard and used by all valve manufacturers. There was a total of 12 alloys and the analysis of these is given in a chart. Manufacturing methods are briefly described. Drawings of the valves are included.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 575

UNCLASSIFIED

DEVELOPMENTS INDIESEL ENGINEERING. Reported by: K. J. DeJuhasz and G. A. Meyer. 63p.

The report covers German Diesel engineering with respect to construction details, injection equipment, engine dynamometer, turbo chargers, Diesel engines of unusual design, instruments for types of research, and engine supervision. Some of the data may be considered new or insufficiently known in the United States because of the war. The field information was obtained during August-November 1945 in visits to numerous plants and in interrogation of individuals. German research programs on Diesel engines are summarized and there is a bibliography listing recent German literature and other Allied intelligence reports on the subject. Photographs and diagrams are included.

Item No. 26

FIAT REPORT NO. 579

UNCLASSIFIED

COOLING FINS FOR AIR COOLED ENGINES; PERMANENT MOLDING OF CYLINDER HEADS AND METHOD OF FINNING CYLINDERS AT B.M.W. (BAVARIAN MOTORWERKE). Reported by: L. E. Bogue and N. Hoertz. 4p.

Brief report of conversations with B.M. W. personnel at the Munich airport regarding the casting in permanent molds of aluminum cylinder heads with many deep fins and the method of rolling fins on cylinders from aluminum strip stock. Examples of this equipment are being sent to Washington.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 582

UNCLASSIFIED

THREAD ROLLING PROCESS FOR FINNED RADIATOR TUBES. Reported by: A. B. Modine. 4p.

Description of a thread rolling process for making aluminum integrally finned flat tube channels as used in radiators for liquid cooled aircraft engines. Aluminum tubing, fitted on a mandrel, is rotated against a thread rolling unit, then notched, flattened and welded into a conventional radiator. Drawing is included.

Item No. 26

FIAT REPORT NO. 591

UNCLASSIFIED

HANOMAG DIESEL ENGINES FOR PASSENGER CARS, TRACTORS AND TRUCKS. Reported by: A. W. Pope, Jr. 18p.

This report presents important details and illustrations of a gasoline engine for a 1.3 liter passenger car, and of 1.9, 5.2 and 8.5 liter Diesel engines, manufactured by the Hanomag Company. All are 4 cylinder engines except the 8.5 liter which is a 6 cylinder engine. The 1.9 liter Diesel engine used for tractors as well as trucks was also supplied for passenger car use before the war, but they found it uneconomical in service where fuel cost is relatively small part of operating expense. However, it was in successful production for several years, and is of particular interest for its small size bore and stroke. The 5.2 liter engine is an example of how the easy starting requirement for a tractor engine has been met. It also has truck, marine and industrial uses. The 8.5 liter is supplied for truck and industrial uses and follows conventional design for this type of engine. Appendix comprises list of reference material forwarded to the Joint Intelligence Objectives Agency in Washington.

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AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 593

UNCLASSIFIED

THE 16 CYLINDER AIR-COOLED DIESEL ENGINE OF THE SIMMERING GRAZ PAUKER A.G. Reported by: A. M. Madle. 28p.

The 16-cylinder, air-cooled, supercharged Diesel engine type SLa 16 of the Simmering Graz Pauker A.G. is a modern successful development in its field and incorporates several novel features. The 16 cylinders are arranged in a "flat X" with 135° included angle, in four banks with four cylinders each. The crankshaft has four cranks and since four cylinders are in the same plane, three of the connecting rods are linked to one master rod. The crank angles and positions of the master rods are important for the balance of the engine. The angles used and projected and other design details for this engine are given, including an engine specification table and performance data based on one cylinder- and block- testing. Its performance exceeded the Maybach type HL 230 tank engine which it was planned to replace. A discussion of special features, a table of engines under development for heavy armored vehicles as supplied from memory by Dipl. Ing. E. Haustein, photographs and rough design drawings are included.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 594

UNCLASSIFIED

HIGH PRESSURE CHEMICAL LIQUID PUMP FORCE FEED LUBRICATORS
POSITIVE ROTARY SUPERCHARGED. Reported by: R. C. Mathewson.
14p.

Pumps, lubricators and superchargers manufactured by Robert Bosch were investigated and it was found that in general their present designs follow well known standard practice. This report describes some unusual features which appear to be improvements over previously known designs. Drawings illustrate the following: Indirect high pressure pump, small cylinder lubricator, six unit barrel type cylinder lubricator, pump lubricator with one rotating and reciprocating plunger, multi-plunger, "Barrel" type lubricator, lubricator for pressures of 6000 lbs per square inch, lubricator for steam engines and vane type superchargers.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 600

UNCLASSIFIED

AIR FILTERS AND OIL FILTERS FOR ENGINES. Reported by: L. E. Bogue and N. Hoertz. 14p.

A report of the manufacture of filters of all kinds used on German vehicles is presented herein. It was found that there were only two manufacturers of filters for engines of any consequence in Germany, The Knecht Kom. Ges., of Bad Cannstatt, and Man & Hummel, of Ludwigsburg. The Knecht firm manufactures oil bath air filters and oil filters for engines of all types. Figures 7 and 8 of this report show a sectional assembly of their Cyclone (Zyclone) oil bath air filter used on Mayback engines in tanks. It was claimed to be 99 $\frac{1}{2}$ % efficient and has a capacity of 750 cubic liters of air per hour. They made lubricating oil filters with rotatable elements, operated with an external ratchet wrench, connected to any shift lever or other device that is frequently operated by the driver of the vehicle, so it is constantly brushed and cleaned. This is covered by U. S. Patent No. 2,136,853. Lubricating oil filter elements were also built up from paper discs and the whole element held to standardized dimensions in line with the national effort to make accessories interchangeable. The Man & Hummel company manufactured practically the same line of filters, including the tank filter, as the Knecht company. They also made air filters for the German Luftwaffe with multiple, tubular elements from woven rabbit hair, and claim 100% efficiency for this type. Lists of patents and drawings are included.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 602

UNCLASSIFIED

ALUMINUM PISTONS FOR AUTOMOBILE AND AIRCRAFT ENGINES. Reported by: L. E. Bogue and N. Hoertz. 5p.

This report gives the results of visits to the two major piston manufacturers in Germany to determine general piston design, type of alloys used and any new or novel ideas in piston manufacture. Piston designs were found to be similar in every respect to those used in the United States, but aluminum alloys in regular production are somewhat different. There was wide usage of an alloy containing 17 to 21% silicon. Alloy formulas for each plant are given. Permanent mold castings and also pressed pistons were widely used. It is claimed that added strength and the improved physical properties of pressed pistons justify the added cost in better performance, and recommend them for heavy duty and high output engines.

Item No. 26

FIAT REPORT NO. 603

UNCLASSIFIED

THE 3.5 LITER, 8 CYLINDER, AIR-COOLED AUTOMOTIVE ENGINE OF THE STEYER-DAIMLER-PUCH A.G. Reported by: A. M. Madle. 25p.

Information regarding this engine was provided by the designer of the engine and additional information by the chief engineer of the concern. The engine was first used on a 2-ton truck and during the war was the power plant for 1 $\frac{1}{2}$ -ton trucks, personnel cars, and the "Raupenschlepper Ost" (Caterpillar Tractor East). The subject engine, although a pre-war design and produced ever since, is of some interest as an example of a successful air-cooled engine of mature design which incorporates a number of unusual details. Specifications and a description of the engine are given. Mention is also made of the special features of the engine. The appendix consists of drawing and diagrams of the engine and components.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 605

UNCLASSIFIED

BUSSING NAG MODEL LD6 DIESEL 100 HP TRUCK ENGINE. Reported by: A. W. Pope, Jr. 6p.

In this brief report section on the Bussing firm and their output of gasoline and Diesel engines for trucks precedes a description and Engine Specification table giving performance and design characteristics of the Bussing-Nag Model LD6 truck Diesel engine. This is a 4-cycle, 6-cylinder, 4.32" bore and 5.11" stroke 105 HP Diesel engine which can be operated on producer gas with spark ignition by a change in combustion chambers. Performance economy and service claims for this engine are very high because of the design of their precombustion chamber. Side and front view photographs of the engine are given.

Item No. 26

FIAT REPORT NO. 612

UNCLASSIFIED

CARBURETORS FOR AUTOMOBILES AS PRODUCED IN GERMANY. Reported by: N. Hoertz and L. E. Bogue. 13p.

All research and development work on carburetors was suspended for the duration of the war. There were therefore no new developments, and no other new systems of supplying fuel to engine cylinders were used other than the well-known carburetor, diesel injection or gas burners. Several engineers expressed the opinion that carburetors will never be replaced by injection on passenger automobiles and small engines because of the elaborate mechanical layout necessary with its greater initial cost, despite arguments as to subsequent economies. Apparently gasoline engines with carburetors were used in tanks because the size and weight of Diesel engines did not readily fit into the available engine space in tank design. Many passenger cars and trucks were converted over to charcoal burners, running on producer gas. The Maybach 300 h.p. engine was equipped with two Solex Downdraft Twin Carburetors with four floats. The Maybach 700 h.p. engine, which was developed for tiger tanks after the war began, was equipped with four Solex downdraft twin carburetors. These carburetors were designed to operate in any direction on a 40% grade, but were alleged to be capable of greater angles. Photographs and sectional drawings of carburetors are included.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 614

UNCLASSIFIED

HYDRAULIC MOTORS AND PUMPS FOR DRIVING ACCESSORIES ON AIR-PLANES AND TANKS. Reported by: L. E. Bogue and N. Hoertz.

7p.

This report gives a brief description and detailed drawings of two experimental oil driven motors and two oil pumps used for driving accessories on airplanes and tanks. They were found at the Alfred Teves Company plant located in Fechenheim near Frankfurt Main. Prints of each assembly with its parts list and its parts prints have been sent to the Joint Intelligence Objectives Agency in Washington. The oil motors have an output of approximately 1.2 and 5.0 H.P. They were still in the experimental stage but actual samples were produced and tested with alleged satisfactory results. They were designed to be used for driving the landing wheels on airplanes to start them in motion prior to landing. One pump is the one used on the Panther tank for operating the steering mechanism. The other is an oil pump designed to be driven at 1425 R.P.M. and to deliver 1900 to 2100 cubic centimeters of oil per minute at a pressure of 60 kg/cm². It was designed to supply oil for actuating hydraulic accessories. Both pumps have been manufactured and used in large quantities.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 620

UNCLASSIFIED

SUPERCHARGED LOOP SCAVENGING. Reported by: A. M. Madle.
12p.

This report presents the development of two-cycle engines with supercharged loop scavenging. The development work was undertaken by the Kloeckner-Humboldt-Deutz Company in their Oberursel plant, and was under the direction of Dr. Schnuerle, the inventor of the loop scavenging. The essential feature of the loop scavenging resides in the arrangement of the ports in direction and location, so that the scavenging air, in entering through symmetrically arranged intake ports incurs the cylinder wall, rises up to the combustion chamber and is deflected downwards to the exhaust ports, centrally situated in respect to the intake ports, thus practically forming a reverse loop. Drawings, curves and charts are presented.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 621

UNCLASSIFIED

FUEL INJECTION WITHOUT INJECTION PUMP. Reported by: A. M. Madle. 13p.

This report covers the development of a fuel injection system, not employing a fuel pump nor a nozzle. Parts of a paper by Dr. Prosper L'Orange explaining the fundamentals of his system are presented here. The translated title of this paper is, "The development of the high-speed Diesel engine up to the smallest sizes without injection pump", printed in "Motoren Technische Zeitschrift", June 25, 1939. Although the L'Orange system in its present state is not acceptable because of the high specific fuel consumption, the Hirth Motoren G.m.b.H. development proves that the proper control of one phase of the injection is possible, and indicates that the shortcoming of the L'Orange system resides in the common control of both phases. The Hirth system designed for gasoline engines of aircraft in 1941 uses air-gasoline supplied by carburetor and supercharger in the conventional way with pumpless injection for the supply of the ignition fuel which is R-Stoff. An injection system with a single discharge channel with satisfactory performance was designed thus proving it is suction by gas flow through a Venturi tube that injects the fuel. The author of this report thinks it possible that a complete solution of the problem of pumpless injection can be worked out. Diagrammatic sketches are included.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 623

UNCLASSIFIED

IGNITION APPARATUS FOR ENGINES OPERATING ON HEAVY FUEL OIL. Reported by: A. J. Poole. 8p.

This report covers a battery ignition device intended to supply a demand for equipment which will furnish a spark of good heat value and prolonged duration, particularly suited to an engine equipped with a solid fuel injection system. R. Bosch G.m.b.H., Stuttgart, has been producing ignition equipment for Hesselmann, Sweden, which has proven highly satisfactory. The arrangement consists of a 12-volt battery, a timer with two contact breakers, and a special transformer coil. There was no opportunity of testing this equipment at the Bosch factory, but a complete set has been sent to Washington, including a spark plug, type DM20S148, which was developed especially for this heavy oil engine service. Bosch test standards are shown. A wiring diagram and drawings of the timer and coils are included.

Item No. 26

FIAT REPORT NO. 624

UNCLASSIFIED

ROBERT BOSCH DEVELOPMENT OF A LOW TENSION SPARK PLUG, SYSTEM "SMITS", ROBERT BOSCH A.G., STUTTGART. Reported by: A. J. Poole. 6p.

Problems in the German development of a low tension flashover spark plug for high altitude use where electrode corrosion and pre-ignition difficulties limit the use of high tension plugs. It was also for use with jet propulsion units using crude oils where heavy dry-fouling occurs. After trying mica and nickel-iron-glass ignition inserts, a ceramic tube fused to the electrodes by a special glass, formed a perfect flash-over surface path and a gas tight seal. Initial gaps of 0.3 to 0.4 could be achieved. Clear drawings of the plugs and inserts and of the circuits used are given.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 635

UNCLASSIFIED

ELECTRONIC IGNITION. Reported by: A. J. Poole. 5p.

An electronic ignition system was produced experimentally by Bosch in Reichenbach, Germany, during the latter part of the war. It is claimed that this system eliminates many of the deficiencies of a conventional magneto system. Basically the circuit involved a condensor serving as an accumulator and charged through a resistance and discharged through the grid controlled tube to the primary of the high tension coil at the spark plug. After completion of the discharge, the grid voltage prevents further passage of current between the anode and cathode of the tube and the condensor charge is again built up. Gas filled tubes with heated electrodes proved better than those unheated electrodes, or high vacuum discharge types. Diagrams are included.

Item No. 26

FIAT REPORT NO. 640

UNCLASSIFIED

KLOECKNER HUMBOLDT DEUTZ (MAGIRUS) 70 H.P. WATER - COOLED AND AIR-COOLED TRUCK DIESEL ENGINES. Reported by: A. W. Pope, Jr. 33p.

Full specifications are given in English and German together with efficiency curves of the Model F 4L514 air-cooled and the Model F 4M513 water-cooled 70 h.p. 4 cylinder Diesel truck engines. A test report on the F 4L514 is given in German. A comparison of the two engines is also made (in German). Diagrams of the two engines are included. The water-cooled engine appears to be less efficient than engines of this class. The air-cooled engine appears to be very efficient from a fuel economy standpoint but rather lower than average water-cooled engine performance from a power view point. This may be due to the high power requirement of the cooling blower at top speed.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 667

UNCLASSIFIED

GERMAN AUTOMOTIVE ENGINES: SUMMARY REPORT. Reported by:
A. W. Pope, Jr. 26p.

Summary of German automotive engine specific performance values that have design advantages worthy of study by American engineers. These include carburized and flame hardened crankshaft bearings, counterweights on crankshafts, inclined valves, push rods instead of overhead camshafts, and injection systems replacing carburetors. A table of the performance of 24 German engines, is followed by a German War Department table of 149 engines in Germany which gives their performance data. Some of the engines are foreign makes. A 1944 secret report on the use of the Diesel engine in the army followed by a 1937 appendix "Fuel production and technical development of automotive vehicles" is appended.

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Item No. 26

FIAT REPORT NO. 668

UNCLASSIFIED

DIESEL ENGINE INJECTION EQUIPMENT IN GERMANY. Reported by:
R. C. Mathewson. 313p.

This report covers the investigation of Diesel injection equipment for automotive, stationary and marine engines. Nothing radically new in the way of basic principle was found, but a number of important new developments with respect to detail of design, construction, and material were found and are reported herein. Each of these new developments is described in a separate paragraph in this report. In each case the paragraph is given a number, which also coincides with the numbers on drawings listed in Appendix A and list of equipment in Appendix B. The following plants were visited: Robert Bosch G.m.b.H.; Friedrich Deckel, Manich; L'Orange A.G., Zuffenhausen; Klockner Humboldt Deuts. Oberursel; Daimler Benz, Wendingen and Unterturkheim; Maybach Motoren Werken A.G., Wangen; Hans Still, Bielebrück; and Carl F. W. Borgward, Sebaldsbruch. At the Robert Bosch plant, pumps, nozzle holders and nozzles, unit injectors, governors, and automatic timing devices were being developed and manufactured. Its laboratory and research work, and production and development results were also investigated. Friedrich Deckel and L'Orange specialized in pumps and nozzle holders and nozzles. The remaining firms developed various types of hydraulic governors, pneumatic governors, single element pumps and flange mounted pumps. Maybach Motoren was experimenting with a converted Diesel unit converted from their own gasoline engine, and equipped with Bosch pump and Deckel nozzle holder and nozzle. Appendices include lists of drawings and bulletins, samples of equipment evacuated factories in Germany where principal Bosch production was made as of January 1945, engines and manufacturers and the injection equipment used by them, and bulletins of L'Orange injection equipment.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 669

UNCLASSIFIED

SURVEY OF GERMAN LOW VOLTAGE MOTOR CONTROL EQUIPMENT. Reported by: L. H. Matthias. 44p.

The purpose of this review is to indicate the trend of thought in Germany and to present those new developments and ideas worth considering by American designers. Electrical switching devices as classified by "Verband Deutscher Electrotechniker" standards, are given. Magnetic contactors and motor starters of new German design are discussed. Also discussed are manual switches and motor starters. Characteristics of overload relays and releases, control circuit devices, and miscellaneous related subjects make up the remainder of the report. The 26 companies visited and the personnel interrogated are listed. Photographs, charts, graphs, and tables are included.

Item No. 26

FIAT REPORT NO. 670

UNCLASSIFIED

SURVEY OF A NEW STORAGE BATTERY. Reported by: L. H. Matthias. 4p.

This is a translation of a preliminary draft of a patent specification on a storage battery invented by Dr. Fredrick Groy of Chemische Fabrik Weyl at Mannheim. In this battery, metallic mercury or the amalgam of another metal acts as the cathode, a lead oxide grid similar to the positive plates of the lead battery is the anode, and a solution of sodium sulfate - sodium hydroxide is the electrolyte. A voltage of 3-4 volts is obtained. Several important problems remain to be solved before a practical battery of this type can be made. A diagram of the experimental battery and of a suggested design are included in the report.

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Item No. 26

FIAT REPORT NO. 672

UNCLASSIFIED

AIR AND OIL-COOLED ADAM OPAL 72 H.P. TRUCK ENGINE. Reported by: O. D. Treiber. 185p.

Engineering drawings are given of an air and oil cooled 3.6 liter, 6 cylinder engine of 90 mm stroke for a 3-ton truck -72 h.p. at 3000 RPM and 74 octane gasoline. This engine was developed to permit trucks to be stored and also to operate on short notice in freezing weather without water cooling and without anti-freezing liquids of the usual sort. Air for cooling of the heads and oil for cooling of the cylinders are the only cooling agents. A description and technical details of the engine are given. Photographs showing three views of the engine are also included.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 674

UNCLASSIFIED

HEAVY DUTY DIESEL ENGINES, MANUFACTURED BY MAN (MASCHINEN-FABRIK, AUGSBURG - NURNBERG). Reported by: A. W. Pope, Jr. 36p.

MAN built a large number of the model WV17.5/22 heavy duty Diesel engines during the war, which delivers 33 HP/cyl. at 1000 rps. This engine was built in 3, 4, 5, 6, and 8 cylinder versions. These engines are good examples of the best practice in this field where fuel economy and long life outweigh the considerations of first cost and weight per horsepower. The following are some features of particular interest: Buchi type exhaust-driven superchargers can be applied to any of the MAN engines with an increase in output of 50 percent; this extra power obtained without reducing engine life. A special paper cartridge is inserted in the combustion chamber for cold starting. The paper is treated with a chemical with low ignition temperature and is therefore self-igniting. The passage to the prechamber is located tangential to the chamber to provide rotary swirl within the prechamber. The cylinder head gasket is a separate steel asbestos ring the diameter of the cylinder sleeve. The cylinder block projects above the top of the sleeve and so provides a shoulder to hold the gasket in place. A separate soft gasket is used for sealing water and oil joints. The cam shaft gear drive is taken from the rear end of the crankshaft adjacent to the flywheel thus keeping to a minimum gear stress resulting from cyclic or torsional reactions. These engines are also supplied equipped for combination Diesel fuel and gas operation. When this is done a small amount of Diesel fuel is injected for ignition purposes. The gas fuel is supplied through the inlet manifold. When operating on gas fuel supplied this way only about 70 BMEP can be developed without causing internal engine temperature sufficient to preignite the inlet gas. Appendix section includes photographs of various MAN engines, both for marine and railcar use, engine specification form, and installation and section assembly drawings.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 683

UNCLASSIFIED

KHD TWO CYCLE ENGINE DEVELOPMENTS WITH SCHNUEERLE LOOP
SCAVENGE SYSTEM. Reported by: A. W. Pope, Jr. 200p.

This report describes development work and testing on 2-cycle loop scavenged spark ignition and Diesel type aircraft engines developed in the laboratory of Klöckner Humboldt Deutz at Oberursel. The experimental Schnürle 2-cycle loop scavenge system operates with a flat top piston and with inlet ports symmetrically arranged on each side of the cylinder at an angle to direct the inlet air against the side of the cylinder barrel and up to the top. Advantages which give a 20% power improvement over the conventional system are enumerated. Disadvantages are also given, the chief of which is that loop scavenging with piston controlled ports at the bottom of the stroke makes it necessary that the exhaust port must remain open after the inlet port closes. The system works equally well with a spark-ignited injected gasoline engine or with a Diesel engine, and KHD development has included both types of engine. Among the engines discussed are a 16-cylinder 2000 HP aircraft Diesel, some radial aircraft Diesels, single-cylinder injected gasoline engine, 12-cylinder marine Diesel, and an 8-cylinder 700 HP tank engine. There have apparently been no commercial applications to high output lightweight engines to prove the success of the system. However, the report gives the results of many test runs on different engines under varying conditions. This document contains English translations and the original German reports of tests, with many curves and design drawings. There are also seven large drawings.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 685

UNCLASSIFIED

FERDINAND PORSCHE - 10 CYLINDER VEE TYPE AIR COOLED 300
HP GASOLINE ENGINE. Reported by: A. W. Poper, Jr.
4p.

This engine was being developed at the request of the German Government for air-cooled military vehicle engines. About 100 engines had been built but they were not entirely successful. Although considerable development work will have to be done before it can be considered a successful engine, there are certain design features that are worth studying. Outline of detail performance and design characteristics are contained on the attached engine specification form. The engine is built with the unconventional number of 10 cylinders arranged in two banks of 5 each in Vee form. The air cooled cylinder is of aircraft type machined from a steel forging threaded at the upper end to receive the aluminum head and flanged at the lower end for attachment to the aluminum crankcase. The engine is built in a unit with an electric generator for electric drive to the vehicle.

Item No. 26

FIAT REPORT NO. 698

UNCLASSIFIED

PHOTOGRAPHING A SINGLE FUEL INJECTION. Refer to Item No.
9 for a complete listing of this report.

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 709

UNCLASSIFIED

VERBRANNUNGSMOTOREN, THERMODYNAMISCHE UND VERSUCHAMASSIGE GRUNDLAGEN UNTER BESONDERER BERÜCKSICHTIGUNG DER FLUGMOTOREN. Reported by: F. A. F. Schmidt. 393p.

Prof. F. A. F. Schmidt's book "Verbrennungsmotoren. Thermodynamische und versuchsmässige grundlagen unter besonderer berücksichtigung der flugmotoren" (Internal combustion engines. Thermodynamic and experimental principles with special consideration of airplane engines). 35 mm. microfilm. Jan 30, 1946. 214 p. Microfilm-\$3.00

This book is essentially a discussion of Otto and Diesel engines. Part A treats general engine problems and part B the special problems of aircraft engines. Each part is further subdivided: A(I) thermodynamics of idealized engine cycles. A(I)2 review of phenomena within the cycles. A(I)3 a study of the essential factors for efficient engine operation (includes theoretical considerations and experimental data on the effect of mixture ratio, compression and ignition). Section A(II) is entirely devoted to the subject of supercharging. The separate treatment of aircraft engines in Part B reflects the complexities arising from operation at changing altitudes. Section B(I) concerns nonsupercharged aircraft engines, B(II) supercharger system driven directly by the motor. Section B(III) discusses the exhaust gas turbo supercharger. Section B(IV) presents a discussion of the suitability of different engine systems for different types of aircrafts and some important relations between engine power and flight performance. Appendix I and II contain some examples of numerical calculations and a treatise on thermodynamic functions. The supplement deals with the results of researches between 1940 and 1945. Research on ignition is particularly emphasized. The supplement also contains a brief treatment of the thermodynamics of gas turbines. Additional supplements to individual pages of the book are found. A bibliography and subject index is added. Finally five graphs of completely calculated thermodynamic functions of combustion gases of engine fuel are given. The book is fully illustrated with drawings, photographs and graphs. Photoprints will not be available from this film, but enlargement prints will be made at a later date and both microfilm and photoprint copies will be available.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 800

UNCLASSIFIED

NICKEL CADMIUM STORAGE BATTERIES IN GERMANY. Refer to Item No. 19 for a complete listing of this report.

Item No. 26

FIAT REPORT NO. 947

UNCLASSIFIED

DEVELOPMENTS DURING THE WAR IN AUTOMOTIVE IGNITION, PARTICULARLY BY THE FIRM OF ROBERT BOSCH, G.m.b.H., STUTTGART. Refer to Item No. 19 for a complete listing of this report.

Item No. 26

FIAT REPORT NO. 951

UNCLASSIFIED

THE GERMAN GASKET INDUSTRY. Reported by: P. F. Niessen. 13p.

This report reviews the field of German gasket manufacture in the U. S. and British occupied zones. It summarizes the processes, materials and equipment used in production and development. The outstanding developments consist of cylinder head gaskets made from Buna or synthetic rubber and steel, the manufacture of three meter wide sheets of compressed asbestos packing and curing or vulcanization of oil seal diaphragms at high temperatures. The complete absence of graphite in the oil seal compound and the method and equipment used for determining the running or sealing characteristics of oil seals is of special interest. A sketch and a photograph of the grease seal torque testing machine and lists of personnel interviewed and targets visited are appended.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 966

UNCLASSIFIED

RECENT DEVELOPMENTS IN THE DESIGN OF KAPLAN AND FRANCIS TURBINES. Reported by: W. Hamm. 53p.

This report covers the development in the design of hydraulic reaction turbines in Germany since 1930. In the refinement of details, reduction of cost, increase of efficiency, cavitation prevention, and extension of the range of specific speeds, considerable progress is indicated. Targets visited included power plants on the Rhine, Inn, and Main rivers, the J. M. Voith Maschinenfabriken, Heidenheim, and Escher Wyss & Cie, Ravensburg, in Württemberg. Forty illustrations and one table are attached to this report. They show general arrangements, wheel sections, details, and hydraulic data. A bibliography is included.

Item No. 26

FIAT REPORT NO. 1034

UNCLASSIFIED

ENGLISH TRANSLATION OF THE FUTURE OF GAS TURBINE INSTALLATIONS. Reported by: R. Stroehlen. 91p.

The papers included in this report make comparisons between gas turbines with and without heat exchangers regarding their efficiency and costs of installation and operation. A further comparison is made between the gas turbine and similar steam installations considering all factors. Suitable graphs, tables, drawings and the original German text are included. These papers are included in an A.E.C. pamphlet entitled "The High Pressure Gas Installations, A New Gas Turbine System Without the Use of Heat Exchanger", and is a reprint from Elektrotechnische Zeitschrift (1941), issue 7, page 150. In German and English.

FIAT ITEM NO. 26

AIRCRAFT ENGINES

Item No. 26

FIAT REPORT NO. 1148

UNCLASSIFIED

THE USE OF HEAT RESISTING STEELS IN THE MANUFACTURE OF GAS TURBINE BLADES IN GERMANY. Reported by: R. Schempp. 21p.

This report discusses the composition and treatment of high temperature resisting alloys found by one German manufacturer to be best suited to the fabrication of gas turbine blades. These are also presented in this report, data on the design and manufacture of the drawn, hollow turbine blade and on the insert for air distribution inside the blade for air cooling. Appendix 1. List of targets visited; Appendix 2. List of personnel visited; Appendix 3. Bibliography; Appendix 4. List of heat resistant steels; Appendix 5. Fatigue test graphs; and Appendix 6. Illustrations of steps in the drawing of a turbine blade.

Item No. 26

FIAT REPORT NO. 1149

UNCLASSIFIED

HIGH PRESSURE STEAM TURBINES. VOL. II - PLATES. Reported by: E. A. Kraft. 99p.

This report consists of plates (graphs, drawings, diagrams, and photographs) illustrating vol. I of "High Pressure Steam Turbines" which is PB L 85169; v. 8, p. 327, this Bibliography.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 160

UNCLASSIFIED

SEWING MACHINERY AND CLOTHING PRODUCTION METHODS. Reported by: C. L. Rosenquist and P. H. Hanes, Jr. 7p.

Survey and evaluation of production methods in German sewing machine manufacture. Investigators considered methods inferior to American ones. During the war the manufacture of lineshaft tabling and Vee belting for sewing machines was prohibited in order to conserve materials. An all wood individual table was built which was sturdy and satisfactory in all respects. A hookup method of providing power for a set-up of individual tabling is used which is flexible and neat. A large proportion of manufacturers use a conveyor system in which operators handle one garment at a time. A very few progressive manufacturers have adopted the "progressive bundle system" which is considered the most efficient American method. An appendix lists names of companies visited, location, product manufactured and number of pre-war employees.

Item No. 28

FIAT REPORT NO. 241

UNCLASSIFIED

OBSERVATIONS OF GERMAN INDUSTRIAL ORGANIZATION. Reported by: R. H. McCarthy. 39p.

An analysis of German industrial organization based on the author's visits to some 21 factories; covering such factors as organization, factory layout, tools, costs systems, and personnel policies. Specific personnel policies of the Siemens and Halske firm are given in some detail as characteristic of working conditions under the Third Reich. These include promotion policy, social disbursements, old age and health benefits, and the utilization of slave labor. There is also a set of tabulations of typical lathe and milling feeds, speeds and cuts for common materials.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 290

UNCLASSIFIED

WIRE PROGRAM SERVICES OF THE REICHSPOST. Reported by:
J. A. Parrott. 14p.

This report contains information on wired radio broadcasting and on program channels for radio broadcasting. Program for extending wired broadcasting service was instituted shortly before the war because of the lack of adequate radio broadcasting facilities and the likelihood of jamming from abroad. Three modulators with carriers of about 155, 210 and 260 k.c are located in a toll office program room, where up to three voice frequency program channels could be switched to their inputs individually. Outputs were mixed and distributed via broad band amplifiers and cable pairs, including regular subscriber loops, without interfering with their low frequency use for telephone purposes. In selecting three carriers to be used consideration is given to broadcasting frequency allocations in the vicinity. Toll cable facilities used for program transmission are listed. Two single channel open wire program carrier systems were available but had not been used. References are listed. Diagrams of systems and equipment, and photographs of equipment are included.

Item No. 28

FIAT REPORT NO. 337

UNCLASSIFIED

GERMAN TEXTILE ROLL-COVERING MATERIALS. Refer to Item No. 22 for a complet listing of this report.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 346

UNCLASSIFIED

PUBLICATIONS AT I. G. FARBEN LABORATORY BUILDING, HOECHST.
Reported by: J. F. Smith. 4p.

This report lists 38 publications (1940-1944) which might prove interesting to the textile industry. It was recommended that the "Mitteilungen" of various textile schools be examined to locate any original material. Cards selected from a collection of I. G. Farben sample cards of military and raincoat fabrics and accompanying directions for dyeing or finishing are filed in Col. Steadman's office together with a classified list. The classes are listed in the report.

Item No. 28

FIAT REPORT NO. 347

UNCLASSIFIED

FACTORS RELATING TO PROSPECTS FOR EXPORTING U. S. COTTON TO GERMANY. (WITH LIMITED INFORMATION ON ITALY AND SWITZERLAND. Reported by: R. C. Jackson. 44p.

An analysis of the German textile industry during the war, its present status and future prospects, with particular reference to possible markets for American cotton. Future consumption of U. S. cotton depends on such factors as exchange (ability of Germans to have acceptable exchange or credits with which to make payments), competition with the extensive synthetic fiber industry developed under the Third Reich, competition with other nations producing cotton and quality and packaging of raw cotton. Investigator believes all these problems can be solved. A brief report is also made on the possible cotton markets open in Italy and Switzerland. Report contains list of cotton merchants and cotton agents in Bremen area.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 398

UNCLASSIFIED

ECONOMIC STUDIES OF THE POWER TRANSMISSION CHAIN INDUSTRY IN GERMANY. Reported by: G. G. Mize. 54p.

This report records information-specific for the plants examined and general for the industry, supplemented with conclusions of the investigator. Target or plant information includes name, location, managing personnel, condition, size, prewar export markets and regulations, and anticipated immediate future on production. Targets visited were: Joh. Winklhofer and Sohne; Köhler and Bovenkamp; Wipperman Jr. A.G.; Ruberg and Renner; Union - Sils - Van de los and Co. General information includes government export regulations, product materials, manufacturing processes and types of equipment. Photographs are included. Sales pamphlets and catalogs from the targets visited comprise PB 7070.

Item No. 28

FIAT REPORT NO. 401

UNCLASSIFIED

WIFO BERLIN EVACUATED PERSONNEL AT MUNICH. Reported by: R. J. Ozol and C. C. Chaffee. 11p.

The principal duty of WIFO was to establish and maintain industries, trades and crafts devoted to the furtherance of tests and research work for the benefit of the German State. WIFO built a new system of storage tanks for the collection, mixing and distribution of oil products to replace the harbor storage facilities. Tables show fuel storage capacity of the various WIFO installations after 1938. The contents of this report supplement and supersede any information presented in Ordnance Progress Report No. 37, entitled "Distribution of fuels and lubricants to the German military forces"

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 403

UNCLASSIFIED

REPORT ON THE GERMAN ECONOMIC SITUATION, 1943/1944. Reported by: H. R. Habicht and W. Jessel. 37p.

A translation of a report on the German economic system, 1943/44 which was issued by the Planning Board of the Speer Ministry, June 29, 1944. It is believed to be the best summary available of the whole German economy as viewed by German economists during the first half of 1944. Topics covered: Commitment of manpower; agriculture; armaments and war production; foreign trade; transportation; consumption; and wage, price, and money policies. Shortages in foods and industrial raw materials as a result of reverses in the war and concentration on armament and war production are the most striking aspects of the report. A later report prepared after the collapse of Germany is given in PB 2420.

Item No. 28

FIAT REPORT NO. 404

UNCLASSIFIED

REPORT ON THE GERMAN ECONOMIC SITUATION, 1944. Reported by: H. Kehrl. 26p.

Translated and edited by Walter Jessel this report was prepared for H. R. Habicht after the collapse of Germany on the basis of such figures as were at hand. It is perhaps the best summary available of the whole German economy in 1944 as viewed by German economists in the early part of 1945. Topics covered: Production; consumption; and wage, price, and money policies. The effects of the loss of occupied territories and allied air attacks on fuel production plants and transportation were decisive in crippling German economic life. Yet production at the end of 1944 held up amazingly well. This report parallels study of German economic situation 1943/44 (PB 2419).

Item No. 28

FIAT REPORT NO. 469

UNCLASSIFIED

NO ABSTRACT

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 516

UNCLASSIFIED

REPORT ON RECENT CABLE DEVELOPMENT IN GERMANY. Reported by: O. Jensen. 6p.

Description of the following developments: Aluminum sheathing of cables by Siemens-Schuckert Kablewerk, experimental work by Dr. Walther Ehlers, of Markische Kabelwerke, Vogel and Detewe, on use of polyvinylchlorid (Igelit) which serves as insulator; and a high voltage oil-filled pressure type cable which operates without the usual oil reservoir and was developed by Johs Mollerhoj, Nordieke Kabel & Traadfabrikker, Copenhagen, Denmark. The cables of Dr. Ehlers are treated at length, beginning with the billet. There is also a short description of general developments in coaxial cables.

Item No. 28

FIAT REPORT NO. 526

UNCLASSIFIED

INDUSTRIAL SURVEY OF PLANTS, METHODS AND PRODUCTS IN GERMAN TELEPHONE INDUSTRY. Reported by: R. W. Augustine. 45p.

This survey contains descriptions of plants and telephone products of the following firms: Neufeldt and Kuhnke G.m.b.H. Hanseatische Apparatbau Gesellschaft, Kiel; Friedrich Merk Telephonbau Aktiengesellschaft, Munich; Electro Acoustic K.G., Kiel; Vereingte Bayresche Telephon Werke, A.G. (Branch of Siemens Halske), Munich; Osnabrucker Kupfer-u Drahtwerk, Osnabruck; and Mix and Genest Aktiengesellschaft Stammhaus, Berlin. A schematic circuit of the Mix and Genest Automatic system and operating notes are missing from this copy. The account of Electro Acoustic K.G. (ELAC), is especially interesting, as this plant was engaged in research during the war in conjunction with problems concerning the underlying principles involved in the design and construction of equipment and instruments to be used in the guidance and firing of explosive missiles by means of electrical and accoustical energy through water. Also included is a brief note on a lacquer coating under the trade name "Duapon" manufactured by Paul Lechler, Fauerbach at Stuttgart. Appended to the report is a glossary of terms and definitions used in the German telephone industry.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 537

UNCLASSIFIED

GERMAN EMPLOYMENT STATISTICS DURING THE WAR. Reported by:
E. L. Deuss. 106p.

Throughout the war there were kept 4 sets of statistics: the Reports of Industry based on factory units and compiled by Trade and Manufacturers' Associations, Employment Reports based on factory units and compiled by product groups or end products, bookkeeping records of the Minister of Labor, and the Manpower Balance Sheets of the Statistisches Reichsamt, the most comprehensive and most objective. Each of these sets of statistics is described in detail. Appendices contain tables of statistics.

Item No. 28

FIAT REPORT NO. 561 and Supplements

UNCLASSIFIED

SOME ASPECTS OF THE FULL FASHIONED AND WARP KNITTING INDUSTRY IN GERMANY. Refer to Item No. 22 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 601

UNCLASSIFIED

OWNERSHIP AND MANAGEMENT, COAL MINING COMPANIES, RUHR, AACHEN, AND SAAR DISTRICTS 1939 - 1945. Reported by:
C. W. Cloe. 43p.

This report shows the percent of stock ownership, the capital stock and the boards of managers. Information was derived from German sources considered reliable.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 666

UNCLASSIFIED

THE SLEEVE BEARING INDUSTRY OF GERMANY. Reported by: C. E. Swartz and F. H. Ragan. 53p.

The methods used in Germany for the production of sleeve bearings during the war were similar to those used in the U. S. Some refinements in process were noted which improved quality, increased production and saved on raw materials. A few alloys were used, less than those used in U. S., and the quality of the product seems to have been inferior to American items. Diagrams are included and the appendices contain a list of German technologists and a list of German plants.

Item No. 28

FIAT REPORT NO. 676

UNCLASSIFIED

GERMAN SCIENTIFIC LITERATURE PUBLISHED DURING THE WAR.
Reported by: N. D. Crane. 85p.

This report outlines the work that was done by Signal Corps investigators in the selection and collection of unclassified German scientific literature for a reference library. It provides brief information regarding the Signal Corps collections of classified military publications and research documents and gives some information on the other Allied agencies investigating German literature, the German publishers and book trade, libraries which are intact and available for reference use, and scientific journals and books published during the war. This report includes a bibliography, lists of some 600 books on electricity, electrical communications, photography, meteorology, physics, chemistry and engineering published since 1939, a similar list of scientific books covering all sciences printed by Julius Springer during the same period and reviews of recent books in the field of electronics.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No.

FIAT REPORT NO. 737

UNCLASSIFIED

ECONOMIC STUDY OF GERMAN SYNTHETIC WAXES. Refer to Item No. 22 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 755

UNCLASSIFIED

HIGHLIGHTS OF GERMAN IRON AND STEEL PRODUCTION TECHNOLOGY. Refer to Item No. 21 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 761

UNCLASSIFIED

ERNST CERLICH INSTITUT OF THE REICHsstELLE FUER HOCHFREQUENZ FORSCHUNG (REICH BOARD FOR HIGH FREQUENCY RESEARCH. Refer to Item No. 9 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 793

UNCLASSIFIED

TECHNICAL EXPLOITATION OF THE GERMAN CHEMICAL INDUSTRY. Refer to Item No. 22 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 801

UNCLASSIFIED

INDUSTRIAL SAFETY IN GERMANY. Reported by: E. G. Meiter and A. J. Toering. 154p.

From a review of some plants and a study of regulations and agencies, it appears that a fairly well integrated program of industrial safety was pursued. Research work was done on problems of industrial physiology, hygiene, efficiency, and welfare. While scientific work was done on the development of methods and equipment for both industrial efficiency and safety, much of it was not applied. Some of the practices and a few types of equipment will prove of interest. A list of the principal locations visited is given. Included are tables, charts, diagrams and many photographs of equipment.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 930

UNCLASSIFIED

TRAINING AND SELECTION OF SUPERVISORY PERSONNEL IN THE I.G. FARBENWERKE, LUDWIGSHAFEN. Reported by: M. S. Viteless and L. D. Anderson. 35p.

Reviews the background, organization, and administration of a program of supervisory training and selection in a large German industrial plant. An analysis showed that poor supervision represented a serious handicap to increased production. Interviews with workers indicated that, while most of them were content with the wage scale, working conditions, social and welfare programs, there was considerable dissatisfaction with the quality of supervision. A training program, consisting chiefly of conferences on sound psychological principles and methods of leadership, was initiated. Approximately two-thirds of the experienced supervisors undergoing such training expressed interest and approximately one-third showed improvement in supervisory practices. As a further step, psychological examinations for the selection of supervisors, involving particularly the use of "characterological" methods, were introduced. These methods are described.

While plans were made for the validation of the psychological examination, these were not consummated because of the invasion. Six appendices are included containing following information: 1) List of German personnel interviewed; 2) list of German factories visited; 3) a bibliography; 4) sample material from the supervisor training program; 5) sample material covering the evaluation of applicant 1 for a supervisor position; and 6) sample material covering evaluation of applicant 2 for a supervisor position.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 1021

UNCLASSIFIED

COUNSELING AND SELECTING PERSONNEL WITH HIGH APTITUDE FOR TECHNICAL TRAINING. Reported by: E. G. Williamson. 2lp.

This report describes certain methods and techniques used in German schools and industrial firms in the early identification, counseling, and placement in appropriate technical training courses of individuals who possess high-level aptitudes. The present study was one part of an integrated investigation covering many aspects of the general utilization of manpower including children, adolescents, students, and adults. In this report special emphasis is placed upon the selection, training, and job placement of those individuals who possess special aptitudes commonly referred to as technical and scientific, as well as those intellectual in nature.

Item No. 28

FIAT REPORT NO. 1036

UNCLASSIFIED

THE PHYSICALLY HANDICAPPED WORKER IN GERMAN INDUSTRY.

Reported by: G. Brighthouse. 1lp.

German law has, since 1921, required each employer of ten or more persons to hire a certain percentage of physically handi-

capped persons. The production, stability, absenteeism, and safety records of disabled workers in German industry have been approximately the same as those of able-bodied employees. Some significant contributions have been made in personnel administration of blind and crippled workers, but less ingenuity has been used with other varieties of physical handicap. The best features include the development of special selection, training and supervision methods; modification of machinery to allow safe and efficient operation; and provisions for the promotion of the handicapped to positions of responsibility. Appendices present the following: (1) List of German personnel interviewed; (2) list of targets visited; and (3) bibliography.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28.

FIAT REPORT NO. 1056

UNCLASSIFIED

SELECTION, TRAINING AND TECHNICAL EDUCATION OF APPRENTICES AND OTHER WORKING PERSONNEL FOR GERMAN INDUSTRY. Reported by: A. Kahler. 28p.

The purpose of this study was to investigate the methods by which Germany tested and selected its working personnel and the system of occupational training and technical education by which it created its great pool of industrial skill. The reorganization of industrial apprenticeship under National Socialism included an enumeration of all "apprenticeable" trades; the creation of "semi-apprenticeable" trades (Anlernberufe); the development of training specifications for each trade, giving detailed descriptions of skills to be taught and of desired methods of training; the development of training curricula; the development of some 3,000 industrial apprentice training shops; and a general expansion of apprenticeship. In 1940 there were not fewer than 1.4 million apprentices in training. Standardization and equalization of apprentice training were furthered by unified journeymen's examinations and by Reich occupational contests. Apprentice training consisted mainly of teaching manual and operational skills, while technical instruction was left to trade schools. The employment offices were the administrative centers of a policy which aimed at a systematic registration, classification, channeling and distribution of all labor. It included systematic vocational counseling of youth leaving school which was done partly on the basis of school recommendations, etc., and partly on the basis of aptitude tests. More advanced technical training was offered by technical institutes, admittance to which presupposed two or three years of apprentice training. Theoretical research and development work was chiefly carried on by graduates of technical universities (Technische Hochschulen). Technical education at the university level is excluded from this study. Measured by American standards the system put too much weight on manual skills and too little on methods of production and explains Germany's comparative weakness in mass production, according to the report. Personnel interviewed, targets visited, and documents and microfilm transmitted to Washington, D. C., are listed in appendices.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 1113

UNCLASSIFIED

THE STATUS OF HYDRAULIC RESEARCH IN GERMANY. Refer to Item No. 9 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 1115

UNCLASSIFIED

AN EXAMINATION OF ATTITUDES ABOUT INDUSTRIAL SAFETY IN GERMANY. Reported by: T. F. Silvey. 20p.

This report based on interviews indicated in Appendix I states the universal acceptance in Germany of industrial accident and occupational disease prevention. German employers recognized adequate prevention as an unquestioned charge against their product, equal in importance to facilities, labor, material and management according to the author. Reorganization during the war of safety operations of a large multi-plant corporation is described. Education and propaganda for safety of the sort used in United States factories was universal and surprisingly enough uncontaminated by Nazi Party content.

Item No. 28

FIAT REPORT NO. 1122

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT I. G. FARBEN-INDUSTRIE, UERDINGEN. Refer to Item No. 22 for a complete listing of this report.

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 1131

UNCLASSIFIED

ON THE THEORY OF THE ELECTRON. Reported by: W. Wessel.
19p.

The author develops a classical theory of the spinning electron, based only on the variables used by Dirac, viz. spatial coordinates, momentum, velocity, and mass, as well as the antisymmetrical tensor of magnetic and electric moments. Equations of motion are set up by formation of Poisson-brackets of the variables with a Hamiltonian function identical with Dirac's. The necessary relations of the variables are established using a reduction to spinors originated by Darwin, and Laporte and Uhlenbeck. Eliminating all additional variables by differentiation of the spatial coordinates one obtains the usual equation of motion of a charged particle increased by certain members with higher derivatives, characteristic for particles with a finite extension in space. It is intended, by conversion of the Poisson-brackets into commutation-relations, to include the reaction of radiation and higher order forces on the ordinary quantum-mechanical formalism. A difficulty of a former paper on this topic is removed. Biographical note is in English. Text is in German.

Item No. 28

FIAT REPORT NO. 1156

UNCLASSIFIED

HYDROSULFITES. Reported by: A. L. Sklar. 48p.

The development of the German hydrosulfite industry and the attempts to obtain, and later to hold, a dominant position are outlined in Part I of this report. Part II summarizes hydrosulfite statistics for I. G. production, sales, I. G. world price and factory cost price trends. The technology of the operation is discussed in Part III; both the batch process as practiced up to 1936 and the semi-continuous process as currently operated are described. In Part IV, the development work aimed at new processes for producing hydrosulfite is summarized. Appendixes list persons interviewed and targets visited. A description of the process for production of zinc oxide special is included. In English.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 1167

UNCLASSIFIED

THE DEVELOPMENT IN THEORETICAL AND APPLIED MECHANICS IN GERMAN INSTITUTIONS DURING THE WAR. 7p.

This report reviews the work in mechanics at several German institutions. It seems that not much work of fundamental character in the mechanics of material was produced during the war. The following are of some importance: 1) The X-ray analysis done at Kaiser Wilhelm Institute, in Düsseldorf; 2) The development of three dimensional photo-elastic work at München Polytechnikum; and 3) The development of calculating machines at the institute of applied mathematics of the Darmstadt Polytechnicum. Appendix I gives a list of personnel interviewed, and Appendix II a list of targets visited.

Item No. 28

FIAT REPORT NO. 1169

UNCLASSIFIED

HANDBOOK OF INDUSTRIAL HAZARDS FROM EXPLOSIVE DUSTS. V. I AND II. Reported by: W. H. Geck.

This report is divided into two volumes. Volume I (PB 85197) deals with dusts, its analysis, the causes, and general methods of prevention of dust ignitions. In Volume II (PB 85198) are described the various dust conditions within certain industries and several hundred analyses of officially confirmed dust explosions are given. This handbook has not been translated and appears in the original (German) form.

FIAT ITEM NO. 28

HEADQUARTERS: DOCUMENTS AND PERSONNEL

Item No. 28

FIAT REPORT NO. 1170

UNCLASSIFIED

THE DEVELOPMENT OF THE GERMAN REICH ACCIDENT INSURANCE, ESPECIALLY DURING THE WAR, 1939 - 1945, AND ITS STATE IN APRIL, 1945. VOLS. I, II, III, AND IV. Reported by: H. Lauterbach.

The first part contains a summary on the fundamental lines of historical development of the Reich accident insurance, from the beginning of legislation to the outbreak of the war. The second part describes the development of the accident insurance system during the war. A brief summary on the development of the formal law and of the rules of procedure is given. The accident insurance law for several special groups of persons formed during the war is presented in detail. The third part contains a description of the state of the Reich accident insurance before the breakdown of Germany, in April 1945. In the original (German).

Item No. 28

FIAT REPORT NO. 1190

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT FR. KRUPP. A. G., ESSEN. Refer to Item No. 22 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 1200

UNCLASSIFIED

SUBJECT INDEX OF DOCUMENTS MICROFILMED AT I. G. FARBEN-INDUSTRIE, A. G., KNAPSACK AND I. G. FARBENINDUSTRIE A. G., ZWICKEL. Refer to Item No. 22 for a complete listing of this report.

Item No. 28

FIAT REPORT NO. 1204

UNCLASSIFIED

MODERN AIR TRAFFIC CONTROL. Refer to Item No. 25 for a complete listing of this report.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 206

UNCLASSIFIED

SURVEY OF THE EQUIPMENT FOR SHIPBUILDING; GERMAN SHIPYARDS.

Reported by: H. R. Pratt and E. R. Smith. 11p.

This report presents information obtained from visits to German shipbuilding plants on specific questions submitted by American and British shipbuilders. Because shipbuilding, except for the submarine building program, was a minor part of the German war effort, there were very few pieces of interesting shipbuilding equipment. Automatic welding had not been used to any extent in the German shipyards. Several yards were experimenting with two processes similar to our Flux Submerged Arc type of welding: Union Melt, developed by Linde Company, and the other known as Elliar developed by Siemens Schuckert, A. G., Berlin. A process for using conventional coated electrodes in an automatic machine in a kind of combination machine - manual welding process was developed. Shipyard welding is not advanced; most cargo ship designs only require welding of butts in shell, decks, tank tops, etc. List of shipbuilding plants is given. Appendix A lists items of particular interest to the American and British shipbuilding industry.

Item No. 29

FIAT REPORT NO. 264

UNCLASSIFIED

FRIED. KRUPP - GERMANIA WERFT - AG - KIEL, MS'S OSTMARK AND STEIERMARK. Reported by: W. P. Spofford. 11p.

A discussion of features of two German Diesel cargo ships built for the Hamburg-American Line, equipped with AC cargo winches. Cargo features, deck winches, propulsion machinery, electrical scheme, and main Diesel engines are briefly described. Reference is made to voluminous drawings and plans, which have been forwarded for reproduction to Mr. R.C. Mills, Secty., Technical Industrial Intelligence Subcommittee, c/o U.S. Maritime Commission, Washington, D.C. This material will be found in PB 13086.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 353

UNCLASSIFIED

CARGO SHIP CRANES AS BUILT BY DEMAG. Reported by: Wm. P. Spofford. 12p.

This report discusses advantages and disadvantages of deck cranes with particular attention to Demag deck crane, based on interview with two officials of Demag Aktiengesellschaft, Duisberg. Subjects treated are the principles, features, and operation of various types of cranes, type and capacity of power supply, and the best application for cranes aboard ship. Two diagrams of cargo plans are included.

Item No. 29

FIAT REPORT NO. 373

UNCLASSIFIED

WHARF CARGO CRANE AS BUILT BY KAMPNAGEL, A. G., HAMBURG. Reported by: R. J. Stoddard. 23p.

Cargo cranes are quite generally used in lieu of ship's cargo gear in European ports. This company has manufactured a great many cargo cranes as well as other types. Their design and workmanship is good. Working drawings of cranes manufactured by Kampnagel are attached. Their most representative crane is described. This crane provides level luffing which is characteristic of all newer types of cargo cranes used in European ports. The level luffing feature permits a truly live boom which can be raised and lowered with a minimum of power, so as to avoid ship's masts. The speed of booming is fast. Accurate control of the load is possibly due to the straight line motion made possible with a fast easily handled boom. Travel motion is slow. It is used very little and only to locate the crane in the working position. Most cranes are powered with direct current and have power lowering with drum type controllers.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 374

UNCLASSIFIED

KAMPNAGEL A.G., HAMBURG, GERMANY, DEMAG A.G., DUISBURG, FIGES, HAARLAM, HOLLAND, S.S. BATAVIER III. Reported by: R. J. Stoddard. 39p.

This is a report on cargo cranes built by 2 German and one Dutch firm. It includes a description of the cranes on the SS "Batavier III" built by Figeo. Also included is a Demag bulletin, June 1938, by T. Post entitled "Demag Deck Level Luffing Cranes (pages 7-19) which gave an analysis of the "Crane-vs-Winch" question.

The German cranes have been standardized (D.I.N.) from 1 to 5 tons capacity. The most common size is 3 ton at approximately 30 ft. radius. They are for piece goods and clamshell work or both. When heavy lifts are to be handled the cargo boom and mast with multiple part lines for loads and book topping is the most feasible. They are generally the level luffing type and most have separate motor drives for each motion. Position of the cranes on the ship and speeds of cranes are considered. A diagram shows speed load curves for 1½ and 3 ton loads. Drawings and photographs are also included.

Item No. 29

FIAT REPORT NO. 376

UNCLASSIFIED

QUADRANT TYPE ELECTRIC STEERING GEAR FOR THE GERMAN 5000 TON AND 9000TON HANSA SHIP PROGRAM - ALSO OTHERELECTRIC STEERING GEAR. Reported by: R. J. Stoddard. 17p.

The best type of electric steering system used on German ships is the quadrant described in this report. A total of 1820 ships have been equipped with this type including the 5000-ton and 9000-ton Hansa ships. Of these 180 employed the latest design using an automotive type hand wheel. This electric telemotor was chosen instead of hydraulic for the Hansa ships in order to eliminate the danger of oil lines being broken as a result of battle action. On narrower, faster ships it is preferred due to its relatively smaller size. Working drawings and photographs accompany the report.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 377

UNCLASSIFIED

ELECTRIC CARGO WINCHES FOR GERMAN MERCHANT SHIPS. Reported by: R. J. Stoddard. 45p.

This is a report on winch design as manufactured by nine German firms, which was completely standardized when development stopped at outbreak of war. Electric winches are built to D.I.N. standards described in another report. Direct current motors and controls employing the one wire system have been used quite generally. This is preferred for Diesel ships which have direct drives to the propeller shafts, either with or without magnetic or electric couplings. On Diesel electric ships with alternative current motors a Ward-Leonard system (motor-generator set incorporated in the winch) is preferred. In 1939 alternating current motors and control were installed on one ship (sunk after few months satisfactory use) and planned for others. The winches are unitized with drum controller and operator's seat mounted on winch. It is only necessary to connect the one wire and anchor bolts to install the direct current winches, or three incoming leads in case of Ward-Leonard system. Drum controllers with hand wheels are used as standard equipment. Working drawings and photographs are included in the report.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 379

UNCLASSIFIED

REPORT ON GERMAN STANDARDS (D.I.N.) FOR MERCHANT SHIPS
DECK AUXILIARIES. Reported by: R. J. Stoddard. 36p.

This report contains the text of standards to which all German merchant ships deck auxiliaries are built. Standards include rules for the construction of winches, anchor windlasses, rudder plants, deck cranes, and winch heads for cargo and warping purposes. Standards give controlling dimensions, capacities, speeds, operating and safety installations, marking and spare parts, regulations. The long drums permitted by these standards require a hand operated screw type spooling device when they are used with multiple part lines for heavy lifts. Drawings are given of ship's cargo crane; rope hook with fastening screws for winches; winch heads for cargo and warping purposes; rope clamps on drums for deck cranes. Charts of rudder post diameter are also given.

Item No. 29

FIAT REPORT NO. 380

UNCLASSIFIED

CARGO EQUIPMENT FOR THE GERMAN HANSA SHIP PROGRAM. Reported by: R. J. Stoddard. 8p.

Diagrams of loading plans and of cargo handling equipment for three sizes of ships built for the war emergency (Hansa) program are presented and described. These ships were built in sizes of 3000, 5000, and 9000 dead weight tons. Steam winches are rated at 80 ft. to 120 ft. per minute. Cargo winches, as well as steering gear and anchor windlasses, are covered in detail in PB reports 1323, 1326, 1328, 1329 and 1331.

Item No. 29

FIAT REPORT NO. 381

UNCLASSIFIED

STEAM CARGO WINCHES AND CAPSTANS FOR GERMAN MERCHANT SHIPS.
Reported by: R. J. Stoddard. 30p.

Steam cargo winches described in this report and used on recently constructed German ships are of old design. Winches are predominantly of cast iron construction with two double acting cylinders and Stevenson link motion control. Steam pressure at the valves is 7 to 9 atms. gauge (103-132 lbs). Winches are generally designed for 16 atms. (235 lbs.) for safety. All winches are designed and manufactured in accordance with D.I.N. standards (See PB 1326). During the war substitute materials for bearings were used with limited success. Included in this report are accounts of work of these firms: Deutsche Werke A.G., Kiel; Schürfee and Co., Lübeck; Atlas Werke, Bremen; Kampnagel A.G., Hamburg. Photographs, diagrams, drawings, and tabulations of dimensions, speed data and specifications are given.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 382

UNCLASSIFIED

ELECTRIC AND HAND HYDRAULIC STEERING GEAR FOR GERMAN 3000 - TON HANSA SHIP PROGRAM. Reported by: R. J. Stoddard. 35p.

Steering gear, described in this report, has an electric hydraulic drive regulated by electric remote control, and is also equipped for manual steering. Thus, the electric generating plant need not be in operation during the day. Gear consists of a primary plant (a hand pump and a pump with electric drive) and a secondary plant (two pressure cylinders, tiller, regulating slide valve, tubes and valves). Steps in operation of equipment and methods of maintenance are given in detail. This system of steering, although less expensive than the quadrant type electric steering used on other German ships, is generally considered too elaborate for the emergency use for which it was intended. Electrical parts were manufactured by A.E.G.; mechanical parts by Atlas Werke A.G. A complete set of working drawings of mechanical parts and diagrams of equipment are given.

Item No. 29

FIAT REPORT NO. 383

UNCLASSIFIED

M.A.N. DRY DOCK CRANES AT BLOHM AND VOSS SHIPYARD. Reported by: R. J. Stoddard. 25p.

Four 45,000 Kg. (45 metric tons) cranes were installed in Blohm & Voss yard because of the difficulties experienced in launching large ships on existing ways. Cranes, described in this report, are of the full revolving, open portal, traveling tower, pillar type, with hinged boom to provide level traversing of the load (level luffing) during luffing of the boom. Detailed assembly drawings, photographs, and specifications included.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 384

UNCLASSIFIED

STEAM AND ELECTRIC ANCHOR WINDLASSES FOR GERMAN MERCHANT SHIP. Reported by: R. J. Stoddard. 23p.

With one exception the German anchor windlasses described in this report are old design. The electrically driven units are merely adaptations of the steam units, of cast iron construction with no welding. Vertical single wildcat electric units of more modern design were built by Ubigau Company of Dresden. Some difficulty was reported in securing good performance of chain over wildcats. Report includes accounts of production of windlasses at Atlas Werke A.G., Bremen; Schärfee and Co., Lubeck; Deutsche Werke A.G., Kiel; Allgemeine Elektrizitäts Gesellschaft, Hamburg. Illustrations include assembly drawings, photographs, working drawings, and diagrams.

Item No. 29.

FIAT REPORT NO. 533

UNCLASSIFIED

INVESTIGATION OF SHIP REPAIR EQUIPMENT. Reported by: E. R. Smith and H. R. Pratt. 14p.

A list of 29 different points of information on ship repair equipment and practices of the Germans was drawn up. The investigating team, working from June 22 to August 1, 1945, investigated 23 German establishments with repair facilities, and grouped the information obtained under the numbers of the points of information. The major differences found were (1) use of heavier capacity crane equipment (2) use of cranes mounted directly on floating docks (3) use of Diesel powered supply units mounted on the dock. Many U. S. practices had no counterpart in German ship repair. A list of establishments visited and drawings of cranes and of a sliding keel and bilge block foundation for drydocks are included.

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Item No. 29

FIAT REPORT NO. 560

UNCLASSIFIED

NEW VACUUM TUBE TECHNIQUES OF THE TELEFUNKEN ROHRENWERKE, BERLIN. Reported by: M. J. Gross. 21p.

In the course of investigating German X-ray tube technology, information of more general interest pertaining to vacuum tubes was obtained from the Telefunken Company, and is the subject of this report. It covers their work on metal-ceramic tubes, glass solder, and aluminum coated iron substitutes for nickel. Technical details on the work of the Telefunken Company are given in the translation, included here, of Patent DRP 761,322, applied for December 6, 1941, not as yet printed, in connection with a report on lower coefficient of expansion solders, dated January 13, 1944. Drawings are included.

Item No. 29

FIAT REPORT NO. 563

UNCLASSIFIED

HANSA TYPE SHIPS. Reported by: W. P. Spofford and N. Oresko. 7p.

This report on the Hansa S. S. "Reinfels" is the result of the interrogation of Herren Schneider of North German Lloyd, Godecken and Sassenhagen of the Hamburg American Line and Bunte of the Fleuderwerke Shipyard. It describes the dimensions, construction, cargo holds and cargo handling equipment, but omits a discussion of the power machinery installations. A reference list of plans and specifications for the Hansa vessel Reinfels is included.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 583

UNCLASSIFIED

SCHNITGER AND PROPELLERS DEVELOPED FOR DOCK TRIALS BY
DESCHIMAG A.G. WESER, BREMEN. Reported by: G. A. Meyer.
5p.

The Schnitger propeller, developed as a substitute for the Kort Nozzle has a nozzle built into the wheel, thereby eliminating the installation of the nozzle ring on the hull of the ship. The Deschimag test propeller was designed to throttle the flow of the water, streamlining it down stream. Photographs of both are included. Details of construction of Schnitger propeller and data sheets and prints of Deschimag propellers have been filed with Shipbuilding Subcommittee in Washington.

Item No. 29

FIAT REPORT NO. 704

UNCLASSIFIED

FINAL SUMMARY OF THE SUBCOMMITTEE FOR SHIPBUILDING IN GERMANY.
Reported by: G. A. Meyer. 16p.

The only German Navy ships of interest to merchant shipping are the high speed, 22,000 h.p. tankers which supplied the fleet and submarines. One outstanding passenger ship was started, the 36,000 ton Vaterland, hull 523. Her power plant was designed to develop 44,000 S.H.P. Speed 24 knots. Eight Benson forced circulation boilers with drum were to operate at 950 I.S.P., 877° superheat. Her twin screw propulsion units were turbo electric. Other developments in the shipping industry are recorded in this report. They deal with turbines, reduction gears, propellers and other ship machinery. Cargo handling equipment and refrigeration are also considered. A list of all C.I.O.S. and F.I.A.T. reports on the German shipbuilding program is included.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 735

UNCLASSIFIED

MERCHANT SHIPBUILDING AND SHIPPING DIFFICULTIES DURING THE WAR. Reported by: G. A. Meyer. 44p.

This report is based on information received in an interrogation of two of the outstanding ship operators in Germany: (1) Herm. Helms, Managing Director, Hansa Deutsche Dampfschiffe Gesellschaft, Bremen; and (2) Richard Bertram, Managing Director, Nord Deutscher Lloyd. The report covers the following subjects: How the German merchant marine fitted into the war picture; the shipping problems and the principal cargoes carried; the Hansa program - 3000, 5000 and 9000 ton cargo ships; the criticism of the ship operators as to the commercial value of these ships after the war; construction costs in the shipyards of Germany and occupied countries; and outline plans and specifications of the ships and tugs built by Hansa. The last section is illustrated but it is possible that the drawings will not reproduce well. Tables showing the Hansa shipbuilding status, participating shipyards, war-time cargoes carried, etc., are appended.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 739

UNCLASSIFIED

MARINE REFRIGERATION. Reported by: J. L. Strauchon. 46p. Most of the information in this report was obtained from refrigerating equipment manufacturers and contractors who specialized in shipboard installation. Some information was obtained from independent research people. The report reviews the reasons for lag in German development of refrigerating equipment and its application to cargo refrigeration and describes typical items of German equipment. The design details of a refrigerated fruit vessel and of the air conditioning of the S/S Bremen are reported as typical examples of German practice. The following are reported: A new automatic compressor capacity control; a heat pump for submarines to provide both cooling effect and heating; a basic study of air-flow requirements indicating new improvement possibilities; use of low sea water velocity in condensers to prolong their life; and insulating methods, including the Hertel-Duncker system, Iporka, a synthetic insulation, and a principle in insulating to prevent sweating of the shell at very low temperatures. Drawings are included.

Item No. 29

FIAT REPORT NO. 775

UNCLASSIFIED

REPORT ON DEVELOPMENT OF GERMAN SHIPPING FROM 1800 TO 1939.

Reported by: G. A. Meyer. 15p.

A short general history of the development of German shipping from 1800 to 1939 giving an overall picture of how the German merchant marine was built up to World War I and how quickly it recovered thereafter. These data and figures were secured by interrogating Messrs. Herman Helms of the Hansa Steamship Line and Richard Bertram of the North German Lloyd. Tables are attached.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 815

UNCLASSIFIED

TECHNICAL HISTORY OF THE GERMAN MERCHANT MARINE. Reported by: G. A. Meyer. 23p.

This history of the German Merchant Marine summarizes developments from the time the first screw propelled ships were driven by a single cylindered low pressure engine, with steam produced in a box type boiler, to the modern Diesel and 140,000 HP turbine driven ships operating at 1400 I.S.P. and 900° F. superheat. The report is in two parts: 1. Development of German marine engines, boilers, turbines, Diesels, etc.; and 2. The development of ship building in Germany. The data, which was provided by German technicians and operators in the Bremen and Hamburg areas, cover the period from 1860 to 1940. During this time the greatest advances were made in design and operation of ships. The appendix gives a chronological listing of noteworthy developments in shipbuilding and lists large sailing vessels which were built by the following shipbuilders: Blohm & Voss; Neptune, Rostock; Reiherstieg, Hamburg; Rickmers, Bremerhaven; Joh. C. Trecklenborg, Geestemünde.

Item No. 29

FIAT REPORT NO. 827

UNCLASSIFIED

MODERN TYPE OF FREIGHTER FOR FAR EAST SERVICE. Reported by: G. A. Meyer. 28p.

The cargo ship described in this report is the result of the experience of the North German Lloyd in Far Eastern Service. It is a very modern triple screw Diesel propelled ship of 17 knots speed. The data was collected from the remaining files in Bremen by Messrs. Bertram and Helms of the North German Lloyd and Hansa Deutsche Dampfschiff Gesellschaft. Two charts are included in Appendices 1 and 2.

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 844

UNCLASSIFIED

GERMAN CONCRETE SHIPBUILDING DURING THE WAR. Reported by:
G. A. Meyer. 23p.

As a result of the shortage of steel during the war Germans were forced to build concrete ships as an emergency measure. This report groups the concrete vessels under three headings: frame built vessels; vessels of the steel side concrete type; and shell construction method. The first group included the following: Two 3000 ton tankers built by Siemens Bau-Union in Rotterdam and Cherson; one 1000 ton cargo lighter built by Heilman & Littmann at Nussdorf near Vienna; two 750 ton tank barges built by Heilmann & Littmann at Nussdorf; one 750 ton cargo lighter - Teubert type, built by Heilmann & Littmann. The steel side concrete type included two 700 ton barges built by Messrs. Heuer in Paris and one 180 ton pontoon. The vessels constructed according to the shell construction method included: Four 3400 ton ocean going tankers, one built at Rügenwalde on the Baltic Sea, and three built at Varna in Bulgaria; two 3700 ton motor freighters built at Rügenwalde; two 1000 ton inland cargo barges built at Neuss on the Rhine and eight built at Neusatz; about fifty 300 ton motor freighters built at Ostwine, Larvik, Rotterdam, Neusatz, Nussdorf, and Perama. Concrete shipbuilding was also used for the following types of pontoons: Submarine boat loading pontoon; workshop pontoon; boat landing pontoon for ferries; pontoon for floating pile driver; pontoon for floating crane; transportation pontoon; construction pontoon for the construction of U boat sections; landing and supply pontoons to carry camouflages. The appendix contains thirteen drawings provided by Mr. Herman Helms of the Hansa Steamship Company.

FIAT ITEM NO. 29

NAVAL CONSTRUCTION

Item No. 29

FIAT REPORT NO. 1009

UNCLASSIFIED

SMALL SCALE SEA HARBOR MODEL EXPERIMENTS. Reported by: O. Kirschmer. 10p.

A detailed description is given of methods of analyzing tide and wave effects in harbor models on a small scale. The methods are semiquantitative and permit approximation of natural conditions. A number of examples are quoted including one complete harbor protection problem. The model installations were tested in the Research Institute for Hydraulics (Forschungsinstitut fuer Wasserbau), Munich/Obernach, and in the River Control Laboratory (Flussbaulaboratorium) of the Institute of Technology, Dresden. Special attention is called to the economy in time and costs gained when comparing a larger number of port installations by means of model tests. Several photographs and diagrams are included. In German.

Item No. 29

FIAT REPORT NO. 1105

UNCLASSIFIED

THE NAVIGATIONAL BEAM SYSTEM "ELEKTRA-SONNE." Refer to Item No. 9 for a complete listing of this report.

FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 15

UNCLASSIFIED

RESEARCH ON THE CYCLOPOLY OLEFINES AT I. G. FARBENINDUSTRIE, GENDORF. Refer to Item No. 22 for a complete listing of this report.

Item No. 30

FIAT REPORT NO. 225

UNCLASSIFIED

WOOD STRUCTURAL RESEARCH AND DEVELOPMENT. Reported by: J. A. Liska and F. W. Gottschalk. 99p.

This report covers visits, interviews and observations at the following institutions and plants: 1. University of Munich and Institut für Waldbau und Forstbenutzung at Munich, 2. Wood Research Laboratory at Kreuth, 3. Professor Otto Graf an der Technischen Hochschule und Direktor des Instituts für Bauforschung und Materialprüfungen des Bauwesens in Stuttgart, 4. Dr. Hugo Seitz and Karl Kubler of the Kubler Co. at Stuttgart, 5. Timber Research Laboratory in Hohenschwangau, 6. Prefabricated Wood House under development by the Otto Bosse Plywood Co. at Stadthagen, 7. Dr. Otto Kraemer at Blomberger Holzindustrie in Blomberg-Lippe. Recent developments in the utilization of wood for structural purposes are described and discussed. An extensive list of documents and publications from the laboratory of Prof. Otto Graf is given.

Item No. 30

FIAT REPORT NO. 276

UNCLASSIFIED

KAISER WILHELM INSTITUT FOR KOHLENFORSCHUNG, MUELHEIM, RUHR. INTERROGATION OF DR. HELMUTH PICHLER AND PROF. KARL ZIEGLER. Refer to Item No. 22 for a complete listing of this report.

FIAT ITEM NO. 30

FUELS AND LUBRICANTS

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FIAT REPORT NO. 299

UNCLASSIFIED

SUPPLEMENTAL REPORT ON THE RUHROL HYDROGENATION PLANT, WELHEIM, RUHR. Refer to Item No. 22 for a complete listing of this report.

Item No. 30

FIAT REPORT NO. 368

UNCLASSIFIED

INTERROGATION OF DR. GUNTER SPENGLER, MUNICH, FORMERLY OF INSTITUTE FOR COAL RESEARCH GERMAN TECHNICAL HIGH SCHOOL, PRAGUE. Refer to Item No. 22 for a complete listing of this report.

Item No. 30

FIAT REPORT NO. 423

UNCLASSIFIED

SYNTHETIC LUBRICATING OIL MANUFACTURE, RHEINANIA-OSSAG MINERALOLWERKE A. G., HARBURG REFINERY. Reported by: J. G. Allen. 11p.

This report is based on the interrogation of Dr. Karl Zerbe, Research Director, and Alois Becker, Assistant Chief Engineer, of Rhenania. It includes the flow sheets of the plant at Harburg and details the design and operation of this plant in its three parts: (1) Wax cracking for olefin manufacture; (2) polymerization of olefins and disposal of used aluminum chloride; (3) finishing of raw polymer into lubricating oil.

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FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 425

UNCLASSIFIED

GASIFICATION OF BROWN-COAL BRIQUETTES IN PINTSCH-HILLEBRAND WATER-GAS GENERATORS AT WESSELING, GERMANY. Reported by: I. H. Jones. 12p.

This is a report of interrogation of Dipl. Ing. Erwin Rose on Pintsch-Hillebrand water-gas generators which were developed especially for employing brown-coal briquettes formed from such brown coals as have an ash which will not exhibit incipient fusion below about 1290°-1300°C

Item No. 30

FIAT REPORT NO. 447

UNCLASSIFIED

STUDY OF PRODUCTION OF SHALE OIL FROM OIL SHALE IN WURTEMBERG. Reported by: F. H. Reed. 105p.

Report on production of shale oil for certain diesel fuels from open pit deposits in the province of Wurttemberg. In addition to these deposits which can be worked at a maximum depth of 8 to 9 meters, plans were made to exploit certain deposits extending back under hillsides. Three methods of recovering the oil were developed: (1) Distillation of oil shale on the ground; (2) distillation of oil shale underground in place; and (3) distillation of oil shale in retorts. Appendices contain four reports in German submitted by the respective shale producing companies, describing operating processes and conditions. Numerous drawings and diagrams.

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FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 508

UNCLASSIFIED

INTERROGATIONS REGARDING USE OF COAL FOR FIRING GAS TURBINES.

Reported by: H. J. Rose. 10p.

The purpose of this investigation was to learn whether coal had been used recently in Germany for firing gas turbines, either commercially or experimentally. The investigation was limited to four industrial companies in Western Germany. No interrogations were made at organizations specializing in power equipment for aeroplanes, ordnance, etc. The four industrial companies visited were as follows: Demag A. G., Duisberg; August Thyssen Hütte, Hamborn; Holzwarth Gasturbinen, G.m.b.H.; and Brown, Boveri & Cie, A. G., Mannheim-Käfertal.

Item No. 30

FIAT REPORT NO. 531

UNCLASSIFIED

STUDY OF METALLURGICAL COKE DEVELOPMENTS IN METHODS OF PRODUCTION AND TESTING. Refer to Item No. 21 for a complete listing of this report.

Item No. 30

FIAT REPORT NO. 566

UNCLASSIFIED

SLANTING TYPE DIDIER COKE OVENS. Reported by: F. H. Reed. 11p.

This report is based on information received on coal carbonization and wartime activities at the Municipal plant at Karlsruhe. It describes the operations of the plant in making gas, coke, tar and benzene from coals obtained from the Saar, Ruhr and Eschweiler districts, its present capacity, manufacturing costs of products and labor conditions. Drawings of ovens are included.

FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 634

UNCLASSIFIED

COAL PREPARATION PRACTICE IN WESTERN GERMANY. Reported by:
T. Frazer and M. G. Driessen. 123p.

Reviews German practice in coal preparation. The dominant washing process is the jig which handles 87 to 88% of all coal washed in the Ruhr area. General plant engineering and design does not appear to be as well developed as in American and British practice. However, some items of individual devices and techniques may be adaptable to American practice. Fine coal jigs, both with and without feldspar, are used almost to the exclusion of other methods for coal under 8 mm. or 10 mm. except that dust under 0.75 mm. is commonly handled by froth flotation. Mechanical developments that may be in part new include dedusting devices, flash dryers, conveyor dryers, resonance screens, froth breakers, and anti-breakage loading devices. The report also describes coal purifying by multiple-stage froth flotation, heavy suspension separation, electrostatic separation, acid extraction of ash minerals and tar oil extraction of coal matter. Some of these processes might conceivably be of use to us ultimately for production of low ash coal for such use as electrodes for the aluminum industry, for carbide and carborundum industries, for sugar refinery carbon and activated carbon, according to the report. The development of coal preparation technology and the construction of plants is largely in the hands of a few contracting firms. These firms have tentatively agreed upon standard designs and specifications for certain items of preparation plant equipment. Copies of tentative dimension sheets of such items are included. Graphs and drawings of plants and equipment are also included. Through the agency of Bergbauverein a comprehensive scheme for the standardization of the plant performance guarantees has been proposed. In this plan forms are suggested for the guarantees of the performance of washeries, screens, and filters. A transcript of the salient parts of this schedule are reproduced in Appendix I entitled Guides for acceptance and supervision of coal-preparation plants, Edition 1943.

FIAT ITEM NO. 30

FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 938

UNCLASSIFIED

GASIFICATION OF COAL. Reported by: C. A. Johnson. 41p.

Of the various processes proposed by the Germans for converting coal into synthesis gas by continuous gasification with oxygen, two of the more recently developed processes are of interest for possibly providing gas for Fischer-Tropsch liquid fuel plants. They are the Surgi process, which operates at a high pressure (20 atmospheres), and the Thyssen-Galocsy process which operates at a relatively high temperature. A number of drawings of the equipment are presented and discussed, and some discussion of the inherent advantages of the processes is offered. Because of the successful adaptation for furnishing gas to some of the large Fischer-Tropsch units, the Koppers combination low temperature carbonization and gasification unit was investigated. Some drawings are reproduced in this report. Also a summary of the status of the Fischer-Tropsch process as offered by one of the authorities in the field is included.

Item No. 30

FIAT REPORT NO. 1144

UNCLASSIFIED

UTILIZATION OF TALL OIL IN GERMANY. Refer to Item No. 22 for a complete listing of this report.

FIAT ITEM NO. 30

FUELS AND LUBRICANTS

Item No. 30

FIAT REPORT NO. 1303

UNCLASSIFIED

COPPERS POWDERED COAL GASIFICATION PROCESS. Refer to Item No. 22 for a complete listing of this report.

Item No. 30

FIAT REPORT NO. 1304

UNCLASSIFIED

GUMZ POWDERED COAL GASIFICATION PROCESS. Refer to Item No. 22 for a complete listing of this report.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 1

UNCLASSIFIED

INVESTIGATION OF MACHINE TOOL PRACTICE OF M.A.N. AT AUGSBURG, GERMANY. Reported by: R. M. Address, A. H. Jobert and C. H. Reynolds. 3p.

An investigation of the general use of machine tools at the M.A.N. plant, manufacturers of Diesel engines for marine propulsion and railway locomotives from 1,000 hp to 15,000 hp capacities. A brief description is given of a machine for rough boring, finish boring and honing Diesel liners. It is of a five station design consisting of a loading station, a rough boring station, a cooling station, a finish boring station, and a honing station. All processes are performed without removal from the machine.

Item No. 31

FIAT REPORT NO. 2

UNCLASSIFIED

INVESTIGATION OF GEAR MANUFACTURE OF ZAHNRADFABRIK AT AUGSBURG, GERMANY. Reported by: J. P. Breuer and E. Dingley. 1p.

The Zahnradfabrik at Augsburg manufactures spur, helical, bevel, worm, and herringbone gears. Brief report is made of production methods which are along well established lines. No short cuts or special machines employing new principles were found.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 3

UNCLASSIFIED

INVESTIGATION OF MACHINE TOOLS OF ADAM OPEL AT RUSSELSHEIM, GERMANY. Reported by: C. H. Reynolds. 2p.
Investigation of facilities of Adam Opel plant at Russelsheim to determine whether there were any new or novel developments in machine tools or methods of manufacture. Machines examined include crush grinding machines, Universal tool and cutter grinder, spline miller for milling slots or keyways, and others. Nothing of particular interest was noted.

Item No. 31

FIAT REPORT NO. 4

UNCLASSIFIED

INVESTIGATION OF MEASURING INSTRUMENTS, GAGES AND CUTTING TOOLS. Reported by: J. P. Breuer and C. H. Reynolds. 24p.

Brief surveys of measuring instruments, gages, and cutting tools as made by ten German manufacturers. Noteworthy is an involute tooth profile grinding machine, made by Schmid and Schaudt, Stuttgart-Hedelfinger. An appendix (in German) gives specifications, photographs and diagrams of this machine.

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 5

UNCLASSIFIED

INTERROGATION OF GENERAL GERHARD ROSE, VICE - PRESIDENT OF THE ROBERT KOCH INSTITUTE, BERLIN AND CHIEF CONSULTANT IN TROPICAL MEDICINE TO THE GERMAN AIR FORCE. Reported by: J. B. Rice, and G. Rosen. 12p.

Report on information obtained from General Rose on the following diseases: Malaria, typhus fever, mite typhus, trichinosis, infectious hepatitis, leptospirosis, bacillary dysentery, amebic dysentery, cholera, scarlet fever and diphtheria, tularemia, trench fever, relapsing fever, syphilis, gonorrhea, lymphogranuloma venereum, leishmaniasis, kala-azar, schistosomiasis, filariasis, scabies, rheumatic fever, blood substitutes, sulfonamides. Some information is also given on immunizations in the German air force and the use of insecticides and insect repellents.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 31

UNCLASSIFIED

THE USE OF HEAT RESISTING STEELS IN THE MANUFACTURE OF GAS TURBINE BLADES IN GERMANY. Refer to Item No. 26 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 101

UNCLASSIFIED

REPORT ON ALTERNATING CURRENT DECK WINCH BUILT FOR MS'S OSTMARK U STEIERMARK FOR INSTALLATION AT FRIED. KRUPP. GERMANIAWERFT A.G. KIEL. Reported by: Wm. P. Spofford. 4p.

This report is based on examination of two winches and interview with chief electrical engineer of company. The driving motor of the cargo winch is a pole changing ring wound motor with one 4 pole and one 10 pole winding; the low speeds being provided by the 10 pole, 565 RPM syn. speed at 47 cycles and high speed with the 4 pole - 1410 RPM syn speed. For speeds below 565 RPM the rotating field of the 10 pole winding is in one direction and the rotating field of the 4 pole in the opposite direction, and the two connected in this bucking condition. Diagram described is not included in report. Name plate data of winches are given.

Item No. 31

FIAT REPORT NO. 102

UNCLASSIFIED

NEW RADIAL FLOW TURBINE DESIGN. Refer to Item No. 26 for a complete listing of this report.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 104

UNCLASSIFIED

SURVEY OF THE ARC CARBON INDUSTRY OF GERMANY. Refer to Item No. 22 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 115

UNCLASSIFIED

SURVEY OF THE CARBON BRUSH INDUSTRY FOR ELECTRICAL EQUIPMENT OF GERMANY. Refer to Item No. 22 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 121

UNCLASSIFIED

MECHANICAL REPORT ON PRECISION CUTTING TOOL AND GAGE PLANTS IN GERMANY. Reported by: J. P. Breuer. 14p.

Thirteen plants including 3 of the largest in Germany were visited and an overall picture was obtained of their methods. Although in several plants some operations were entirely different and somewhat faster, it was concluded that the accuracy and finish of the products examined do not come up to U. S. A. standards.

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 138

UNCLASSIFIED

FLAT KNITTING MACHINERY IMPROVEMENTS DEVELOPED BY H. STOLL & COMPANY, REUTLINGEN, WURTEMBERG, SINCE 1935. Reported by: P. H. Hanes, Jr. and C. L. Rosenquist. 4p.

Probably the most important development of this firm up to the present is the double system LIFADO machine, which it is claimed produces approximately 65% more fabric than the single system LIFAM machine. This report includes descriptions of the following: Hand knitting machine type KCRP, hand knitting machine type JBO, hand pearl stitch machine type FAL, fully automatic power flat knitting machine with double system and changes by side levers type JFUDO, and automatic universal power Jaquard knitting machine with automatic stitch transferring type AJUM.

Item No. 31

FIAT REPORT NO. 160

UNCLASSIFIED

SEWING MACHINERY AND CLOTHING PRODUCTION METHODS. Refer to Item No. 28 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 183

UNCLASSIFIED

REINHOLD AND CO. G.m.b.H., FRANKFURT AM. - SUED. Reported by: R. L. Perry. 4p.

Iporka, a urea--formaldehyde foam, used for insulation in field refrigerators, is described. Cost of the material for sealed refrigeration sheets of various sizes is given.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 259

UNCLASSIFIED

ELECTRICALLY OPERATED COPY MILLING MACHINE, MUELLER AND MONTAG, G.m.b.H. Reported by: R. M. Address and H. G. Green. 24p.

Discussion of a copy milling machine for reproducing dies and molds of all kinds, which was evacuated from Leipzig to an Army Ordnance Depot for further study. It was discovered that because of sabotage, extensive repairs would be necessary and it was believed that the machine had no features not already available in American equipment. An appendix has a translation of a set of instructions and photographs for the use of this machine.

Item No. 31

FIAT REPORT NO. 261

UNCLASSIFIED

GAS COMPRESSORS MANUFACTURED BY FRIEDERIC UHDE K. G., DORTMUND, GERMANY. Reported by: W. H. Reynolds. 7p.

This report contains descriptions of gas compressor and pressure gage manufactured by this firm. Compressor is a 5 stage, 3,000 atmosphere (45,000 lb. per square inch) machine which is further compressed by a separate machine which is essentially a 75,000 lb. per square inch oil pump. Uhde attempted to build the entire outfit into a single unit but was unsuccessful. 450 lbs. of drawings were evacuated.

Item No. 31

FIAT REPORT NO. 271

UNCLASSIFIED

GERMAN HIGH FREQUENCY, DETECTOR AND CABLE DEVELOPMENTS.
Refer to Item No. 9 for a complete listing of this report.

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 282

UNCLASSIFIED

COMBINATION STEAM MACHINERY RECIPROCATING WITH ECONOMY DEVICES INCLUDING EXHAUST TURBINES. Reported by: Wm. P. Spofford. 12p.

At Deschimag, Bremen, the complete drawings of Hull No. 974-S.S. Rheingels - were reviewed including engineering files and pamphlets. The machinery design is typical of general European attempts to modernize the old Scotch boiler-reciprocating combination to a competitive position and has been taken as the example to discuss these possibilities. Drawings were acquired showing general arrangements, schematic system plans, Lentz cylinder complete, boilers, filtering and general condensate features, propeller, etc. Also general calculation files showing the development, including alternative schemes from inception to and past delivery--March 1938 to July 1944. As a background on High Efficiency Steam Reciprocating Development, Dr. Bauer's 1937 paper on this subject and many booklets covering Bauer-Wach turbines, hydraulic couplings, filtering apparatus, etc. including several extreme studies up to 150 atm. steam pressure, were acquired. Drawings and reference material were too voluminous for reproduction in this report.

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MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 287

UNCLASSIFIED

QUADDED TOLL CABLES. Reported by: J. A. Parrott. 14p.

This report describes practices in the design, installation and maintenance of German communication systems which are different from American practices. Among these are the use of aluminum wire, helical cord spacers on conductors, spiral-four construction, styroflex insulation, straight splices, underground repeater and terminal offices. Some of these measures were employed for military security and critical material reasons rather than because of service or economy considerations. Sheath mileage of German toll cable installation was 100 to 125% greater than before the war. Introduction of aluminum was due to the shortage of copper. Helical paper insulators appeared to prevent trouble with cables due to leaks. Spiral-four construction filled the available layer space to the best advantage. Testing was relied on to indicate trouble in cables. Two typical cable makeups and their purposes are given. Report includes a list of references and a drawing of a cable form.

Item No. 31

FIAT REPORT NO. 318

UNCLASSIFIED

CLOTH CUTTING MACHINERY AND CUTTING PRODUCTION METHODS.

Reported by: C. L. Rosenquist and P. H. Hanes, Jr. 3p.

Brief information on German cloth cutting machinery and cutting production methods in clothing factories. Four manufacturers of cloth cutting equipment visited were: Krauss and Reichert, Stuttgart; Carl Buchwald Maschinen-Fabrik, F. Segebrecht and Co., and Carl Bunger Werkzeugmaschinen-Fabrik in Berlin. The investigators believed that generally American cloth cutting machinery and cutting production methods are superior. The squared round knife blade made by Krauss and Reichert may be of interest. This type of blade minimizes tendency of blade to push fabric away from blade and minimizes adherence of fabric to blade.

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MACHINERY AND MECHANICAL EQUIPMENT

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FIAT REPORT NO. 373

UNCLASSIFIED

WHARF CARGO CRANE AS BUILT BY KAMPNAGEL, A. G., HAMBURG.
Refer to Item No. 29 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 383

UNCLASSIFIED

M.A.N. DRY DOCK CRANES AT BLOHM AND VOSS SHIPYARD. Refer to
Item No. 29 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 386

UNCLASSIFIED

GERMAN BALL AND ROLLER BEARING MANUFACTURE. Refer to Item
21 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 388

UNCLASSIFIED

COUNTING DEVICES GERMANY. Reported by: J. L. Manke.
llp.

This account of production of counting devices is divided into three parts: 1. General purpose counters used on production machinery to indicate number of pieces produced or number of revolutions. 2. Small counters used on such instruments as watt-hour meters, gas meters, speedometers. 3. Specialized counters such as dial and computing types used in gasoline and oil dispensing. During the war German counter manufacturing, which was limited to wartime requirements, developed no new techniques. Special features of general counters were: extensive use of quick reset counters; use of watch as part of hand speed indicators; variety of printing attachments for counters. Thermo-plastic material (Trolitul) was extensively used for figure wheels and pinions for use in small instrument counters. Counters of gasoline and oil dispensing apparatus were mostly of oil dial type. Plants visited are listed.

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MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 392

UNCLASSIFIED

TEXTILE MACHINERY AND CHUCKING MACHINES MANUFACTURED BY A. MONFORTS MASCHINENFABRIK AT MUNCHEN. Reported by: E. Dingley and A. H. Jobert. 19p.

Two types of automatic single spindle chucking machines are built by this plant. One is entirely mechanically operated and is similar to standard turret, or capstan, lathe. The other, described in great detail in this report, is the Monforts all-hydraulic, single-spindle chucking machine of which several sizes have been built. The hydraulic system for this machine, manufactured by Gebr. Heller in Nurtigen, is described in Appendix A. Appendix B contains engineering information on mechanically operated semi-automatic machine illustrated by photographs and diagrams.

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FIAT REPORT NO. 393

UNCLASSIFIED

AUTOMATIC BAR MACHINES MANUFACTURED BY ALFRED H. SCHUTTE AT KOLN-DEUTZ. Reported by: A. H. Jobert and C. H. Reynolds. 10p.

The machine described in this report is a new 4-spindle automatic bar machine known as the VD 25. It is believed to be more flexible than any automatic screw machine previously designed although it would cost 35% more than the average screw machine previously built. For small shops a machine of this type appears to have excellent possibilities. A photograph and a complete list of dimensions of various parts are given.

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 396

UNCLASSIFIED

SURVEY OF LEADING MANUFACTURERS OF GAS COMPRESSORS. Reported by: L. P. Jehle. 40p.

An investigation of the leading manufacturers of gas compressors in the American, British and French zones, in Germany revealed the following: I. There has been an interesting trend in the development and production of reciprocating machines for the very high pressure range up to 3500 atmospheres; II. Several types of interesting rotary compressors for medium pressures and large volumes are made and used in considerable quantities; III. There have been no outstanding wartime developments in reciprocating equipment for use up to working pressures of several thousand pounds per square inch; IV. There have been no outstanding developments in turbo-compressors. The manufacturers covered in this report are: Demag, at Duisburg; Gutehoffnungshutte Oberhausen A. G. at Sterkrade; Brown-Boveri & Cie, at Mannheim; Maschinenfabrik Esslingen A. G., at Esslingen; Klein, Schanzlin & Becker A. G., at Frankenthal; Uhde Gesellschaft, at Dortmund and Hagen; Messer & Co., GmbH., at Frankfurt/Main; Maschinenfabrik Surth, at Surth, bei Koln; Maschinenfabrik Augsburg-Plattling A. G. (MAPAG), at Augsburg. Photographs and detailed drawings of compressors and parts are shown.

Item No. 31

FIAT REPORT NO. 397

UNCLASSIFIED

SURVEY OF THE CARBON AND GRAPHITE ELECTRODE INDUSTRY OF GERMANY. Refer to Item No. 9 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 398

UNCLASSIFIED

ECONOMIC STUDIES OF THE POWER TRANSMISSION CHAIN INDUSTRY IN GERMANY. Refer to Item No. 28 for a complete listing of this report.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 402

UNCLASSIFIED

CARL SCHENCK TORSION BAR TESTING MACHINE. Reported by:
T. Franzen. 4p.

The information contained in this report was obtained from interrogation of personnel of the Carl Schenck firm of Darmstadt which made one of these machines for the Ober Kommando des Heeres. Specifications and description are given. The machine is very limited in its scope. It can be used for endurance limit research and as such is of value to the British Ministry of Supply testing agencies.

Item No. 31

FIAT REPORT NO. 413

UNCLASSIFIED

TUNGSTEN AND MOLYBDENUM WIRE. Reported by: D. E. Tesen.
17p.

The German tungsten and molybdenum industry was investigated to determine what developments had taken place in the manufacture of wire for use in lamps and radio tubes. There were no real changes in the methods of extraction or purification of the oxides and metals. The requirements placed on tungsten metal were relatively low as all metal was pressed into comparatively small ingots, the maximum size being about 850 grams. The Osram factory had been completely looted, as were all factories except the Radium Electric Company. Diagrams of apparatus and flow sheets of processes are given. Tungsten plants discussed are: Gebruder Borchers; Osram Glühlampenfabrik; Radium Electric Company; and Metallwerke Plansee. Molybdenum plants discussed are Osram; Metallwerke Plansee; Radium Electric Company.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 434

UNCLASSIFIED

INDUSTRIAL HEAT TREATING FURNACES IN GERMANY. Reported by:
C. H. Stenenson. 24p.

The following subjects are discussed in this report:
I. Heat treating furnaces - general, electric heat and gas fired heat; II. special furnaces - recuperator counterflow rotary, pusher and rotary billet heating; III. furnace atmospheres; IV. recuperators; V. high chrome alloy heat resisting tubes; and VI. melting furnaces. Drawings and list of plants inspected are included.

Item No. 31

FIAT REPORT NO. 441

UNCLASSIFIED

INVESTIGATION OF THE B.M.W. 003 TURBINE AND COMPRESSOR BLADING. Refer to Item No. 26 for a complete listing of this report.

Item No. 467

UNCLASSIFIED

DEUTSCHE SPINNEREIMASCHINENBAU, A. G. INGOLSTADT, OBB.
Reported by: J. L. Truslow and R. M. Jones. 9p.

This is a report of machinery design and manufacturing methods in a spinning machinery plant. Description is given of factory layout, and detailed observations on cotton cards, cotton drawing frame, cotton roving frame, cotton and ring spinning frame.

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 470

UNCLASSIFIED

FRATELLI MARZOLI AND C. PALAZOLLO SULL'OGLIO, ITALY. Reported by: J. L. Truslow and R. M. Jones. 12p.

This company is the only important manufacturer of textile machinery in Italy. The investigators were shown through the plant by Mr. Luigi Marzoli who has been a member of the American Society of Mechanical Engineers for 35 years. There were a surprising number of American machine tools and the layout and methods reflect American influence. Hydro-electric power is used. At the time of the visit the plant was running at 25 per cent capacity. In normal times it employs 2400 people, but only 1900 men were then at work. The following are described: The metallurgical and chemical laboratories, central tool and gauge control and inspection, drafting room, foundry, general machine shop layout, and the various types of finished textile machinery manufactured.

Item No. 31

FIAT REPORT NO. 474

UNCLASSIFIED

GESSNER RING SPINNING FRAME FOR WOOLEN SYSTEM. Reported by: J. L. Truslow. 8p.

This report contains diagrammatic sketches illustrating the self-threading twister head used on a ring spinning frame made by Ernst Gessner AG, Aue, Saxony. Up to the roller beam, the machine is a conventional ring frame of the cotton type, Above the beam, a system of drafting and a type of creel are fitted which adapt the frame for spinning from condenser roving.

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MACHINERY AND MECHANICAL EQUIPMENT

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FIAT REPORT NO. 476

UNCLASSIFIED

INVESTIGATION OF DEEP WELL TURBINE SUBMERSIBLE PUMP MOTORS. Refer to Item No. 26 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 477

UNCLASSIFIED

INVESTIGATION OF MECHANICAL VARIABLE SPEED DEVICES. Reported by: F. J. Mcentee. 7p.

Visits to six manufacturers of mechanical speed-changing devices in the British, American and Berlin areas. In Germany the desire to speed up production within the safe limits of the tools resulted in unusual developments in the application of mechanical variable speed drives and controls to precision machine tools. The Berlin firm of Friederich Steinruch, later Friedrich Cavallo, has a drive of unusual design, which should be rated variable torque. Diagrams and illustrations.

Item No. 31

FIAT REPORT NO. 479

UNCLASSIFIED

PRELIMINARY SURVEY OF PORTABLE-SAWING AND DRYING EQUIPMENT IN GERMANY. Reported by: J. A. Liska and F. W. Gottschalk. 15p.

A preliminary survey into the fields of portable-sawing and kiln-drying equipment was undertaken to determine whether there were any special military developments during the war. All the equipment of the firms investigated and similar machinery in use by various forest fabricating firms were standard industrial designs produced before the war. Appendix contains detailed data on plants and personnel investigated, appendix B a list of references, and appendix C a list of photographs on file at the Forest Products Laboratory, Madison, Wisconsin. Chart for the drying of wood is also included.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 489

UNCLASSIFIED

SURVEY OF FANS AND TURBO BLOWERS. Refer to Item No. 26 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 498

UNCLASSIFIED

TECHNICAL SURVEY OF ELECTRIC MOTOR INDUSTRY IN GERMANY. Reported by: R. Smith and G. E. Petterson. 28p.

This is a report on the practices of a representative group of electric motor manufacturers as observed in the investigations made on visits to plants in Germany, also to two plants in France and Italy which operated under German direction during the war. It can be said that very little development in the electric motor industry has occurred during the war years. Subjects discussed in the report are: Frames; stator cores; brackets; bearing caps; bearings; shafts; rotor cores; fans; commutators and slip rings; substitution of aluminum wire for copper in motor coils; open vs. semi-enclosed stator slots; single, double, and triple slot rotors windings; A.C. stator windings; German motor practice compared with American; type of motors; motors for agricultural use; adjustable speed drive for A.C. systems; A.C. induction motor with aluminum frame and end brackets; industry standards for temperatures of motors; and special generators. Tables, photographs, diagrams, a graph and list of companies visited included.

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MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 502

UNCLASSIFIED

HEAVY ELECTRICAL MACHINERY MANUFACTURE IN GERMANY. Reported by: C. C. Hutchins. 9p.

This report compares German and American machinery and lists the general similarities. The report also describes the most interesting differences of construction features of frames, cores, poles, spiders, windings, commutators, bearings and insulation, and mentions some special designs such as deep bar squirrel cases, and enclosed underground designs. Investigations of the factories revealed that Siemens Schuckert is by far the largest electrical concern in Germany but the Brown Boveri plants led all in products, methods and technical skill. The AEG plant ranks about the same as Siemens in quality of equipment manufactured.

Item No. 31

FIAT REPORT NO. 509

UNCLASSIFIED

RECENT ENGINEERING DEVELOPMENTS IN SWITZERLAND ON GAS TURBINES AND STEAM GENERATORS. Refer to Item No. 26 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 511

UNCLASSIFIED

ACETYLENE GENERATOR DESIGNS IN GERMANY. Refer to Item No. 22 for a complete listing of this report.

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MACHINERY AND MECHANICAL EQUIPMENT

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FIAT REPORT NO. 512

UNCLASSIFIED

SURVEY OF LOW-VOLTAGE, AIR CIRCUIT BREAKER PRACTICE, GERMANY. Refer to Item No. 9 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 514

UNCLASSIFIED

REPORT ON HIGH VOLTAGE SWITCH GEAR. Refer to Item No. 9 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 516

UNCLASSIFIED

REPORT ON RECENT CABLE DEVELOPMENT IN GERMANY. Refer to Item No. 28 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 523 (586)

UNCLASSIFIED

STUDY OF THE INDUSTRIAL PROCESSING INSTRUMENT INDUSTRY IN GERMANY. Refer to Item No. 9 for a complete listing of this report.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 527

UNCLASSIFIED

THE MANUFACTURE OF CYLINDERS AND PRESSURE VESSELS IN GERMANY BY THE HOT SPINNING METHOD. Reported by: H. I. Anthony, III. 38p.

Over 20 manufacturers were visited and only two employed hot spinning methods in the production of small cylinders and these were secondary operations; these secondary processes were not comparable with practices in the U.S. In one instance hot spinning was done on small engine lathes and the spinning diameter did not exceed $2\frac{1}{2}$ " in the other, the maximum hot spun diameter was 4" on the neck end of the cylinder. Hammer forging and pressing was applied to pressure vessels and cylinders produced from seamless tubes and pipes and to deep-cold-drawn capsules, the open ends of which were subsequently hammer-forged into the neck end of the cylinder. Only one small spinning machine was seen at the Deutsche Waffen und Munitionsfabriken Works in Karlsruhe. Photographs.

Item No. 31

FIAT REPORT NO. 564

UNCLASSIFIED

BOILERS, FORCED DRAFT BLOWERS, STEAM PIPING AND EVAPORATORS USED IN THE GERMAN MERCHANT MARINE. Reported by: M. L. Ireland, Jr. 51p.

Item No. 31

FIAT REPORT NO. 566

UNCLASSIFIED

SLANTING TYPE DIDIER COKE OVENS. Refer to Item No. 30 for a complete listing of this report.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 573

UNCLASSIFIED

INVESTIGATION OF THE GERMAN AIR-CONDITIONING AND REFRIG-
ERATION INDUSTRY. Reported by: G. Berg. 35p.

Based upon the writer's three months' investigation in Germany, the consensus is that Germany has not developed anything unknown to American industry nor have they produced equipment or shown technique which surpass those of American manufacture. It is the writer's estimate that the German air-conditioning and refrigeration industry lags the American industry on the average by five to ten years. A separate appendix is devoted to a discussion of each of the following: Air conditioning, refrigeration, refrigerants, compressors, condensers, evaporators, refrigeration control valves, electrical cycling controls; tubing, piping, and fittings; cabinets. A list of plants visited of interest to the American industry, with a short history of each

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FIAT REPORT NO. 577

UNCLASSIFIED

SURVEY OF THE LEADING MANUFACTURERS OF PRESSURE VESSELS. Re-
ported by: R. W. Clark. 52p.

The number of pressure vessel manufacturers in Germany is comparatively large but the great majority of them limit themselves to one of several classes. One or two of the firms have been doing considerable work with the Union Melt Process and getting very good results. The outstanding new type of pressure vessel developed is the wrapped band vessel as designed by I. G. Farbenindustrie, A.G., and manufactured by the Deutsches Rohrenwerke, A.G.-Thyssen Werke, Mülheim a/Ruhr. A translation of a specification by one of the leading engineers of the I. G. Farbenindustrie, A.G., gives the method of calculating stresses. A classification of important firms and reports on individual firms are presented. The manufacture of banded vessels, of pressure vessels by the Roechner process, and of clad steel, or Plattierte Bleche as it is known in Germany, are described. Sketches for wrapped band vessel and clad steel packs, and photographs of apparatus, are included.

FIAT ITEM NO. 31

MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 581

UNCLASSIFIED

BEIER INFINITELY VARIABLE SPEED FRICTION DRIVE TRANSMISSION. Refer to Item No. 19 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 582

UNCLASSIFIED

THREAD ROLLING PROCESS FOR FINNED RADIATOR TUBES. Refer to Item No. 26 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 589

UNCLASSIFIED

CONVEYING MACHINERY AND ALLIED PRODUCTS. Reported by: E. C. Burton. 26p.

The object of the investigation was to find out what Germany had developed in engineering, designs and manufacturing processes in respect to: (1) Conveying machinery; (2) gear reducers; (3) roller and silent chain; (4) other steel chains; (5) malleable chains; and (6) coal preparation machinery. No designs were found that were highly outstanding or "revolutionary." Discussions of designs of belt conveyor idlers and other conveyor accessories, coal mine chains, bushing and pin locking, portable belt conveyors, and other items are given, together with a list of plants visited. Drawings and photographs of some of this equipment are appended.

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MACHINERY AND MECHANICAL EQUIPMENT

Item No. 31

FIAT REPORT NO. 592

UNCLASSIFIED

HOT ROLLING OF SPECIAL SHAPES. Refer to Item No. 21 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 611

UNCLASSIFIED

DESIGN AND CONSTRUCTION OF HIGH PRESSURE COMPRESSORS AND REACTION EQUIPMENT. Reported by: N. W. Krase. 55p.

This report consists of a collection of photographs and drawings showing details of construction of gas compressors and equipment for high pressure reactions used in Germany. The material includes compressors used over the range from 500 to 4000 atm. and reaction equipment at 200 and 700 atm. Some notes in German (with an English translation) on a method of fabricating pressure vessels for use up to 4000 atm. by winding strips of grooved steel on a cylinder (Wickelverfahren) are also included.

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FIAT REPORT NO. 625

UNCLASSIFIED

SPUR GEAR HIGH PRESSURE PUMPS DESIGNED BY EGERSDOERFER.

Reported by: N. Hoertz and L. E. Bogue. 13p.

This report contains brief descriptions and complete assembly layouts of nine pumps developed by a German inventor. The pumps are of a standard spur gear design, and the inventor claims they are useful in the fields of machine tools, airplanes, ship, and mining industries, and that they were tested successfully on the V-2 rocket, but due to the termination of the war were never in actual production.

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MACHINERY AND MECHANICAL EQUIPMENT

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FIAT REPORT NO. 628

UNCLASSIFIED

HYDRAULIC PROFILE MILLING MACHINE, CONSTRUCTED BY DR. FRITZ FAULHUBER AT MURRHARDT NEAR SULZBACH. Reported by: A. H. Jobert and E. Dingley. 11p.

In an engineering office and a small plant set up for experimental purposes only in the town of Murrhardt, Dr. Faulhuber has constructed an experimental hydraulic profile milling machine which is capable of reproducing any given profile within .005 mm. From Dr. Faulhuber's description of the hydraulic system, it is believed that he uses a balanced hydraulic system which is unaffected by the foaming of the fluid or by small leaks. The machine is capable of producing completely universal motion in any plane. Dr. Faulhuber was engaged in research work to simplify the mechanism, and in as much as this machine was still in the process of development, no catalog information was obtainable. Most of the engineering information is in the form of incomplete, partial sketches and drawings. Appendix A, attached to the report, is a translation of a German article with a sketch describing the method of operating copy milling machines used for deep and outline milling. The sketch will not reproduce well.

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FIAT REPORT NO. 629

UNCLASSIFIED

ERNST GROB, MUNICH. Reported by: A. H. Jobert. 29p.

Mr. Grob demonstrated a circular thread rolling machine which is comparable in design to that manufactured by Mr. Leo Steinle in London. He manufactures his thread rolls from hardened steel, and grinds the threads from solid by means of a single pass, using a serrated grinding wheel of extremely fine grit. Appendix A presents details of design and construction of electrically hydraulically controlled thread-rolling machine, model RM II, made by Ernst Grob, Tool & Machine Manufactory, Munich. Photographs are included.

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FIAT REPORT NO. 631

UNCLASSIFIED

ADLER WERKE, FRANKFURT. Reported by: A. H. Jobert. 86p. This report is an investigation covering a Magdeburg vertical center column hydraulic chucking machine used at Adler Werke, Frankfurt in processing internal combustion engine flywheels. In external appearance and method of spindle control, this machine is practically a duplicate of the Bullard (Mult-i-Matic) six spindle vertical automatic chucking machine built by Bullard Mfg. Company, Bridgeport, Conn. The interesting features are, however, that the Magdeburg machine is completely hydraulically operated except for the spindle drive mechanism which is positive through a gear train. Individual spindle speed variation is obtained by means of simple change gears. Attached to this report as Appendix A is a set of operating instructions together with photographs, hydraulic circuit diagrams and an electrical circuit diagram. A translation of a complete description of the machine by Chief Engineer Ewald Dornhöfer VDI, Magdeburg, obtained from the Ford plant at Koeln comprises Appendix C. Appendix B is a translation of a pamphlet obtained from the firm of Heller in Nürtingen by Chief Engineer Alfred Durr which describes various hydraulic mechanisms used on the Heller machines and also includes a description of the hydraulic units for operating the tool slides on the Magdeburg machine. This is illustrated by photographs and drawings as well as Appendix A part 2 which is a translation describing the electrical hydraulically controlled thread rolling machine. Type RMII manufactured by Ernst Grob, Munich. This is designed to produce high grade threads of any form according to the cold-rolling process by means of turning transversely movable precision profile rolls under high pressure.

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FIAT REPORT NO. 633

UNCLASSIFIED

PROFILE MILLING AND TOOL GRINDING MACHINES, DECKEL, MUNICH.
Reported by: A. H. Jobert and E. Dingley. 42p.

This report describes the Deckel profile milling machine model KF1 and the Deckel tool grinding machine model S1, with photographs and diagrams. The new profile milling machine is designed around a compound pantograph mechanism which has a ratio of 1:1 between the cutter and the stylus so that the cutter will duplicate the exact profile of the template. A unique feature of this machine is that the stylus is provided with an optical mechanism which comprises a light beam and a bulls eye on a circular frosted glass. The purpose of this optical arrangement is to accurately control the roughing operation so as to leave the correct amount of material to be removed by the finishing cut. A novel feature of the tool grinding machine S1 is the method of mounting the slides on anti-friction roller bearings.

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FIAT REPORT NO. 647

UNCLASSIFIED

VISCOSE MAKING MACHINERY IN GERMANY. Reported by: L. L. Truslow. 202p.

This report reviews the equipment used in the manufacture of viscose in Germany and supplies detailed engineering information by means of drawings and/or photographs of the most important developments, i.e. continuous steeping and pressing of alkali cellulose, continuous shredding, crumb aging and xanthate dissolving.

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FIAT REPORT NO. 666

UNCLASSIFIED

THE SLEEVE BEARING INDUSTRY OF GERMANY. Refer to Item No. 28 for a complete listing of this report.

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FIAT REPORT NO. 669

UNCLASSIFIED

SURVEY OF GERMAN LOW VOLTAGE MOTOR CONTROL EQUIPMENT. Refer to Item No. 26 for a complete listing of this report.

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FIAT REPORT NO. 706

UNCLASSIFIED

REPORT ON SELENIUM DRY RECTIFIER DEVELOPMENTS. Reported by: H. Dauber. 41p.

This report gives information on research in the field of selenium dry rectifiers, carried on at the laboratory of the Institute of Physics, University of Prague, under the direction of Prof. Gudden. This laboratory was sponsored by the SAF, Nürnberg, and carried out both fundamental investigations on selenium as well as experiments on commercial SAF rectifiers in order to improve the permissible peak inverse voltage and reduce the effects of aging phenomena. A report is included on a meeting in Prague, which was held in Nov., 1944 by all German agencies concerned with dry rectifier developments. This meeting produced a detailed analysis of all problems involved on methods used by the various firms in the manufacture and improvement of selenium dry rectifiers. The theoretical aspects of various improvements are treated in detail.

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FIAT REPORT NO. 725

UNCLASSIFIED

HIGH PRESSURE, HIGH TEMPERATURE HEATING, 250 ATM. Refer to Item No. 9 for a complete listing of this report.

Item No. 31

FIAT REPORT NO. 734

UNCLASSIFIED

REPORT ON VELOX BOILERS. Reported by: G. A. Meyner. 3p.

The subject boiler was developed for combustion under pressure, that is, high speed conduction which cut down the size of the heating units. The fuel chamber is super-charged. The internal pressure is kept constant by an axial blower. The blower is driven by a gas turbine which receives its gas supply from the supercharged combustion chamber of the steam generator at 500 to 550°C. This boiler can operate with fuel oil, but if washed blast furnace gas or coke oven gas is used, a gas blower is added to the air blower shaft of the gas turbine. These units are started by a variable speed motor or by a turbine in which case the air gas ratio cannot be altered. With its small cubic content and its 45 ton weight, the unit produces 22 tons of steam per hour at 30 atmosphere with coke oven gas. This Brown-Boveri Velox boiler was built in Mannheim and installed during 1941. Only six of them had been installed in Germany.

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FIAT REPORT NO. 754

UNCLASSIFIED

VIBRATING BALL MILL FOR PULVERIZING FINE MATERIALS. Reported by: P. M. Tyler. 20p.

The investigator first saw this vibrating ball mill operated by an unbalanced eccentric in a hard-carbide manufacturing plant. It is known as Schwingmühle "vibrator", manufactured by Siebtechnik G.m.b.H. It is the standard grinding and mixing machine in Germany for tungsten carbide and other powder metallurgy products and is reported to have been used for manufacturing pencil lead, for processing cosmetic talc, and for grinding dyes, lacquers, paint pigments, silica flour, clay, ceramic batch materials, sulphur, gypsum, graphite, chalk, rubber waste, wood meal, lignite and other minerals, pharmaceuticals and food products. The novel principle of this mill is covered by German and foreign patents (taken out by I. G. Farben) and it has been on the market for about 10 years. Small units made by the same manufacturer were advertised and sold in the U.S. before the war for laboratory work, but the investigator does not know of any mill of similar type being employed by American mineral industries. Photographs are included and an appendix contains an article contributed by Dr. Robert Olbrich to a German trade journal on fine grinding of metal powders in vibrating ball mills. Data on the pulverization of aluminum and alloys of silver are given, accompanied by 17 illustrations.

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FIAT REPORT NO. 785

UNCLASSIFIED

ELECTRICAL CONTACTS. Refer to Item No. 21 for a complete listing of this report.

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FIAT REPORT NO. 864

UNCLASSIFIED

THE MANUFACTURE OF HAND SEWING NEEDLES IN GERMANY. Reported by: H. A. Prym. 26p.

This report describes the manufacturing, finishing and packaging processes of hand-sewing needles in Germany. The larger part of the industry is modern and well equipped. Nearly all the equipment was built by regular machine designers. No development in the machinery field took place during the war years, and all equipment in Germany was built prior to the outbreak of the war. The following machines stand out as significant in the German technology: (1) Automatic stamping and eyeing machine built by Finzsch & Holle (formerly Kaiser) Iserlohn and Aachener Maschinenbau, Aachen; (2) automatic burr grinding machine built by Bändgens, Aachen (Schumag patents); (3) packaging machines built by Bändgens, Aachen (Schumag patents) and the packaging machines built by Dossman & Co., Iserlohn; (4) labeling machine built by Jagenberg, Düsseldorf. The following appendices are included: I. List of personnel interviewed and targets visited; II. Needle standards of Aachener and Iserlohn quality; III. Technical data by Bändgens, Aachen; IV. Photographs and drawings of various machines, etc. Illustrations nos. 10 and 11 are missing from the report.

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FIAT REPORT NO. 908

UNCLASSIFIED

THE SIEMENS AND HALSKE TELEPRINTER, T-TYP 60. Refer to Item No. 7 for a complete listing of this report

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FIAT REPORT NO. 911

UNCLASSIFIED

STYROFLEX DIELECTRIC CAPACITORS. Reported by: V. E. Swain. 5p.

The manufacture, construction and tests of capacitors having Styroflex as the dielectric are briefly described. This report covers only the use of styroflex after it had been supplied in tape form. For the manufacture of the material itself and the process of preparing it in tape form, reference is made to FIAT Final Reports 724 and 870. Styroflex is used as a dielectric for capacitors as it is non-hygroscopic, easily manufactured, and although its characteristics are not entirely comparable to mica they are definitely superior to those of waxed paper. The Styroflex film was exclusively manufactured by the Norddeutsche Seekabelwerke at Nordenham and was supplied to such well-known capacitor manufacturers as Felten und Guilleaume, and Siemens and Halske.

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FIAT REPORT NO. 928

UNCLASSIFIED

SPIRAL BEVEL AND BEVEL GEAR FIELD IN GERMANY. Reported by: L. C. Patchin. 8p.

This report reviews the field of German manufacture of spiral bevel and bevel gears during the war years and summarizes the most significant practices, i.e., machines used, feed and speeds, cutters, blank manufacture, steels, hardening and lapping. It is stated that the larger part of the industry is modern and mechanically well equipped. No development in the machinery field took place during the war years and all equipment in Germany was built prior to the outbreak of the war. A bibliography lists related reports.

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FIAT REPORT NO. 942

UNCLASSIFIED

SHOE MACHINERY IN GERMANY. Reported by: H. Schwabe. 7p.

In a study of five German shoe machinery manufacturing plants in the Frankfurt area, no wartime developments or improvements were found. New developments or experiments on shoe machines during the war were prohibited by the German Government. At the beginning of 1939, production of shoe machinery was entirely discontinued except that absolutely necessary for military purposes. The report briefly discusses the shoe machinery industry, indicating a reduction in production of both the machinery for the industry and for the product, shoes. Appendices present the following: (1) Personnel interviewed; (2) targets visited; and (3) bibliography.

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FIAT REPORT NO. 948

UNCLASSIFIED

REPORT INDEX ON GERMAN AERONAUTICAL RESEARCH DOCUMENTS.

Reported by: C. S. Weaver. 106p.

This report contains a complete index in English and German to the research papers appearing in the yearbooks for German Aeronautical Research ("Jahrbuch der Deutschen Luftfahrtforschung"), published by the German Dissemination Center for Scientific Communications on Aeronautics Research of the Chief of Air Services, "Zentrale für Wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters", (ZWB), for the years 1939 through 1944, and the yearbooks published by the German Academy for Aeronautical Research, ("Jahrbuch der Deutschen Akademie der Luftfahrtforschung"), for the years 1939 through 1942. There are 832 reports listed in this collection. These papers cover a wide range of subjects and include, besides general aeronautical reports, documents in the fields of electronics, communications, photography, optics, mechanics, chemistry, metallurgy, meteorology and medicine.

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FIAT REPORT NO. 954

UNCLASSIFIED

A HIGHLY SENSITIVE D.C. CONTROLLING AND MEASURING DEVICE.
Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 955

UNCLASSIFIED

SPECIAL MECHANICAL FEATURES OF LINDE-FRANKL OXYGEN PLANTS.
Reported by: J. S. Swearingen. 43p.

This report describes in detail the novel elements of large Linde-Frankl oxygen units not fully described in previous reports, i.e., the large turbo-compressors, low temperature turbo-expander, fractionating towers, nitrogen condensers, liquid air filters, switching valves, piping, and insulation. The details contributing to the high efficiency of the compressor at 6 to 1 ratio are analyzed. It is a multi-stage radial unit with a flexible shaft and impellers of different diameters. The turbo-expander is a single radial impulse turbine and is not outstandingly good. The fractionating tower construction and performance are given. The individual tray efficiency is a maximum of 1.6; the spacing 3.5 inches. The liquid air filters have a ceramic medium with passages 0.0022 to 0.0043 inch diameter. The details of the

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FIAT REPORT NO. 956

UNCLASSIFIED

CELLULOSE SHEETING AND SAUSAGE CASING MACHINERY AND PROCESSES. Reported by: O. V. Kohorn and J. L. Costa.
65p.

This report describes machines and processes used in the production of cellophane sheets and casings at Kalle & Co. A.G., Wiesbaden-Biebrich. The details of and formulae for the moisture proofing process and a German patent review on the subject are also included. Appendix I gives a list of German personnel interviewed, Appendix II a list of factories visited, Appendix III a bibliography, and Appendix IV a list of drawings, diagrams, and photographs.

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FIAT REPORT NO. 961

UNCLASSIFIED

PAPER AND TEXTILE MACHINE DESIGN, RELATING TO THE MANUFACTURE OF WADDING, FACIAL TISSUE, SANITARY NAPKINS AND THIN TISSUES. Refer to Item No. 22 for a complete listing of this report.

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FIAT REPORT NO. 966

UNCLASSIFIED

RECENT DEVELOPMENTS IN THE DESIGN OF KAPLAN AND FRANCIS TURBINES. Refer to Item No. 26 for a complete listing of this report.

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FIAT REPORT NO. 1010

UNCLASSIFIED

REVIEW OF THE DESIGN OF SUBMERGED HYDRO-ELECTRIC POWER PLANTS. (SYSTEM ARNO FISCHER). Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 1018

UNCLASSIFIED

RUBBER VULCANIZATION ACCELERATORS PRODUCED BY I. G. FARBEN-INDUSTRIE A. G. HOCHST, ELBERFELD, LEVERKUSEN. Refer to Item No. 22 for a complete listing of this report.

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FIAT REPORT NO. 1034

UNCLASSIFIED

ENGLISH TRANSLATION OF THE FUTURE OF GAS TURBINE INSTALLATIONS. Refer to Item No. 26 for a complete listing of this report.

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FIAT REPORT NO. 1038

UNCLASSIFIED

BEARING JEWELS OF HARDENED SYNTHETIC SPINEL. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 1054

UNCLASSIFIED

GERMAN DESIGN PRACTICE FOR LARGE DRY TYPE GASHOLDERS. AN EVALUATION. Reported by: H. Liese. 131p.

The evaluation is a review of German developments in the design and construction of dry gasholders during the pre-war period and summarizes significant accomplishments. Wartime efforts were largely confined to upkeep, repair and protection. However, wind tunnel tests of model structures provide more definite design information concerning the intensity and influence of wind pressure and were helpful in the development of a very efficient ventilator. The translation of the manuscript covering the design of a 2,560,000 cubic foot gas holder includes the general specifications, detail calculations and design drawings of special features of the holder. The design is complete in detail with references to theory, research and practice on which it is based. The metric system has been retained in the calculations because of the German structural steel sections involved. It is an excellent reference for those concerned in the design or manufacture of such structures.

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FIAT REPORT NO. 1067

UNCLASSIFIED

SURVEY OF HIGH PRESSURE EQUIPMENT DESIGNS IN GERMANY. Reported by: P. G. Reynolds. 39p.

This report summarizes design information on chemical equipment used for pressures of 300 atmospheres (4500 pounds per square inch) and above. Drawings illustrate the main points of the design of converters and closures, pumps, piping and valves. Information is also included on materials of construction for parts of interest. Five appendixes include: 1) List of German personnel interviewed; 2) list of targets visited; 3) bibliography; 4) list of material evacuated; and 5) seventeen drawings and high pressure formulas.

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FIAT REPORT NO. 1069

UNCLASSIFIED

SURVEY OF THE PRINTING PRESS MANUFACTURING INDUSTRY IN GERMANY. Reported by: W. M. Stocker. 9p.

This report is a survey of 15 plants manufacturing printing presses and allied machinery in Germany. Thirteen plants manufactured printing presses, one paper-converting machinery and one paper-making machinery. General statements are made indicating types of machinery manufactured. In some cases capacities and continuity of operations performed by specific machines are given. Export matters and personnel welfare are spoken of and a brief comparison is made between certain types of machines of German manufacture and those of like type manufactured in the U.S. Lists of personnel interviewed and targets visited are included.

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FIAT REPORT NO. 1076

UNCLASSIFIED

DEVELOPMENT OF METAL BELLOWS IN GERMANY DURING WAR YEARS THROUGH 1946. Reported by: J. F. P. Farrar. 8p.

This reports the developments in the manufacture of metal bellows in Germany during the war through 1946; brass bellows of good quality are manufactured, but much more slowly than is common in the United States; however, no developments in the industry purportedly took place during the war and production methods as compared to those in the United States are antiquated. Appendices I and II contain a list of German personnel interviewed and targets visited, Appendix III lists one article evacuated to Washington.

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FIAT REPORT NO. 1078

UNCLASSIFIED

METAL HOSE, PIPE LINE COMPENSATORS AND METAL EXPANSION JOINTS IN GERMANY. Reported by: J. F. P. Farrar. 7p.

This reports the developments in the manufacture of metal hose, pipe line compensators and metal expansion joints in Germany. Hose of good quality is manufactured with more emphasis on welded types than in the United States. Pipe line compensators are highly developed, with emphasis on radial motion types as contrasted with axial motion expansion joints. Appendixes I and II include a list of German personnel interviewed and a list of targets visited, and Appendix III gives a list of documents evacuated.

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FIAT REPORT NO. 1113

UNCLASSIFIED

THE STATUS OF HYDRAULIC RESEARCH IN GERMANY. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 1116

UNCLASSIFIED

QUICK CALCULATION OF A-C HIGH VOLTAGE OVERHEAD LINES. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 1124

UNCLASSIFIED

CIRCULAR GRIT CHAMBERS. Reported by: G. M. Ornsen. 26p.
This report describes the two main types of circular grit chambers developed in Germany in recent years with detailed data about installations built of either type. It is illustrated by construction and assembly drawings, photographs and diagrams. The types are: The Blunk Grit Chamber and the Geiger Grit Chamber. Three appendices are included containing: a list of German personnel interviewed; a bibliography; and a list of twelve drawings.

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FIAT REPORT NO. 1127

UNCLASSIFIED

A REPORT ON THE FLEXIBLE SHAFT INDUSTRY IN GERMANY. Reported by: W. J. Kupfrian. 54p.

This report reviews the field of flexible shafting, its manufacture, and principal uses as observed in Germany. Hand-winding and automatic methods of manufacture of both flexible shaft core and casing are included. The more popular types of flexible-shaft machines and the accessories used in connection therewith are also treated. Exhibits include assembly drawings and photographs of shaft assemblies and components, machines, hand-pieces, angle heads, speed changers, winding equipment and principal flexible-shaft accessories. Appendix I contains a list of German personnel interviewed, Appendix II a list of factories visited, and Appendix III a bibliography.

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FIAT REPORT NO. 1130

UNCLASSIFIED

THE MANUFACTURE OF SINTERED MAGNETS IN THE "MAGNETFABRIK DORTMUND" OF THE DEUTSCHE EDELSTAHLWERKE, A. G., KREFELD. Refer to Item 1. 21 for a complete listing of this report.

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FIAT REPORT NO. 1145

UNCLASSIFIED

PRODUCTION MEANS AND TOOLING FOR COMPUR SHUTTER RAPID NO. 00
Reported by: M. Schwartz. 9p.

The report reviews the production means and tooling used for the manufacture of Compur Shutter Rapid No. 00 by Friedrich Deckel in Munich. A line of special machinery originally designed for shutter production only is discussed. The machines referred to are the Universal Engraving Machine, Universal Tool Miller, and Universal Tool Grinder. Photographs are included.

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FIAT REPORT NO. 1149

UNCLASSIFIED

HIGH PRESSURE STEAM TURBINES. VOL. II - PLATES. Refer to Item No. 26 for a complete listing of this report.

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FIAT REPORT NO. 1152

UNCLASSIFIED

DESIGN PRACTICES AND CONSTRUCTION OF CENTRIFUGAL COMPRESSORS BY LEADING GERMAN MANUFACTURERS. Reported by: P. Goldmann. 45p.

This report reviews German design practices and construction methods in the field of centrifugal gas compressors. Detailed construction drawings of impellers and hydraulic channels are included. The design constants used by the German engineers for the layout of impellers are listed. Characteristic performance curves for the compressors described are presented. Photographs and drawings are included.

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FIAT REPORT NO. 1153

UNCLASSIFIED

MAHLE HOT CHAMBER PRESSURE DIE CASTING MACHINE. Reported by: R. Schempp. 6p.

The value of the Mahle hot chamber die casting machine has been the subject of considerable controversy. It has been criticized as being too complicated and too dangerous to find application in the United States. This report explains the reasons for its development, namely, it was designed for casting alloys which are highly subject to oxidation, and which cannot be handled by ordinary cold chamber type of equipment. A sketch and bibliography are included.

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FIAT REPORT NO. 1155

UNCLASSIFIED

THERMAL IMAGES FOR TRANSFORMERS. Refer to Item No. 9 for a complete listing of this report.

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FIAT REPORT NO. 1161

UNCLASSIFIED

REVIEW OF CENTRIFUGAL CASTING METHODS. Refer to Item No. 21 for a complete listing of this report.

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FIAT REPORT NO. 1183

UNCLASSIFIED

COMPENSATION OF GROUND CURRENT THROUGH PETERSEN REACTORS AND THEIR APPLICATION IN THE BEWAG 30 KV NETWORK. Reported by: E. Krohne. 19p.

This report presents a discussion of several methods for the prevention of ground hazards in high voltage cable networks. This is done through the compensation of the capacitive ground current by Petersen reactors. Their application in the distribution systems of the Berliner Kraft- und Licht A.G., is described. Diagrams inclosed.

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RAILWAY EQUIPMENT

Item No. 32

FIAT REPORT NO. 378

UNCLASSIFIED

BOHN AND KAHLER A. G., KIEL, GERMANY. Reported by: R. J. Stoddard. 8p.

The purpose of this investigation was to gather data on the ships deck auxiliaries believed to be manufactured by this company. They have no designs of such equipment and have not manufactured it in recent years. They do manufacture a series of small vertical steam engines for driving generators, etc. These engines are believed to be of some interest and are described in this report.

Drawings represent (1) the standard line of single cylinder steam engines built in sizes of 12 horsepower, 20 h.p. and 40 h.p. (2) the standard line of two cylinder steam engines which are built in 80 and 150 h.p. sizes, and (3) the two cylinder 155 mm (6") bore by 140 mm (5½") stroke engine.

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FIAT REPORT NO. 578

UNCLASSIFIED

AUTOMOTIVE POWER TRAINS, CLUTCHES, TRANSMISSIONS AND STEERING MECHANISMS. Refer to Item No. 18 for a complete listing of this report.

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 95

UNCLASSIFIED

THE POWER INDUSTRY IN GERMANY. Reported by: TIIC. 427p.
This document is a report by an American team of investigators sent to Germany by the Utilities Sub-Committee, Office of War Utilities, War Production Board, Technical Intelligence Committee, to investigate the German power industry with reference to new developments that may have been made since the start of the war, and to obtain information of the effectiveness and extent of air raid attacks, air raid protection devices, etc. The information is grouped under these headings: Steam generating power plants, hydro-electric power plants, substations and electrical transmission systems, electrical equipment manufacturers and a summary report on German power plant and electrical transmission system. Photographs and diagrams are given. Included as exhibits are: H. Lent's article "Experience with Benson boilers, Scholven"; Otto Engler's article, "The design of high-pressure boilers" issued by Vereinigte Kesselwerke A. G., Düsseldorf; flow diagrams of power equipment; and a complete list of exhibits.

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UTILITIES, BRIDGES

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FIAT REPORT NO. 96

UNCLASSIFIED

WAR UTILITIES SUB-SOMMITTEE. WATER SUPPLY, SEWAGE, AND INDUSTRIAL WASTE TREATMENT. 339p.

A detailed report on water supply, sewage, and industrial waste treatment as observed in Germany. Most emphasis is placed on water supply, with a general discussion of the design, operation, and maintenance of plant and equipment prior to and during the war. This is followed by specific descriptions of 16 large scale water systems and 62 pages of plates and diagrams. Part B covers the status of sewage treatment in Germany from 1938 to the present time. There is a general discussion, reports on visits to 39 targets, and 46 pages of illustrations. Part C summarizes industrial waste treatment from 1938 to 1945. In all three fields there was relatively little development during the war and there was, of course, great damage from bombing attacks.

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UTILITIES, BRIDGES

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FIAT REPORT NO. 272

UNCLASSIFIED

TELEGUNKEN A. G., DACHAU, GERMANY: C. H. F. MULLER, A. G.,
FUKLSBUTTEL, HAMBURG. Reported by: R. H. McCarthy, J. R.
Townsend and P. Mertz. 8p.

This report consists of two parts: 1. Information on high frequency communication systems developed by Telefunken; 2. Information on miscellaneous projects at C.H.F. Muller, A.G. For army use Telefunken developed three high frequency communication systems: 1. 53 cm. "Michael" which permitted tuning to 10 independent wave lengths; 2. 48-50 cm. "Rudolf", (10 or 15 wave lengths); 3. A broad band system under development to work on 11 and 15 cm. and to transmit 100 voice channels simultaneously. Dr. Horst Rothe, formerly in charge of this work, had also developed silicon crystals for detectors and had had experience with magnetrons in the .7-1.5 cm., 3 cm. and 9 cm. ranges. Projects of C.H.F. Muller described in this report are: 1. Manufacture of X-ray apparatus, and auxiliary equipment; 2. Underwater sand apparatus; 3. Low frequency parts for Molch IV radar; 4. High voltage equipment, 1 to 2 million volts; 5. Gas filled rectifier tubes; 6. Preparation for manufacture of 10 cm. magnetron.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 274

UNCLASSIFIED

REPORT ON ILLUMINATION. Reported by: J. L. Kilpatrick.
16p.

This report contains a summary of developments in lighting design and practices in Germany, and separate reports on manufacturers of lamps and lighting equipment. Except for developments relating to anti-aircraft search-lights and black-out lighting equipment, manufacturing was largely limited to adjustable bracket fixtures for local lighting. Incandescent lamps were the most predominant lamps. Osram had developed a 15,000 watt air cooled Mercury Vapor lamp but no fuller data on it could be found. Glass and porcelain-enameled metal predominated in light-control materials. Generally, lighting standards were lower than those in the United States. Technical high schools conducted regular courses in Illuminating Engineering. Factories and institutions treated separately are: Dr. Ing. Schneider & Co.; G.

Schanzenbach & Co.: Siemens-Schuckert (Nurnberg); Osram Co.; Technical High School, Munich; Sistrach-Licht, Stuttgart; Karl Pfisterer, Stuttgart; Technical High Schools, Stuttgart and Karlsruhe; Gebr. Kaiser & Co., Neheim; Potter & Schultze, Essen; Emailierwerke Gebr. Krumm, Remscheid; Radium Lamp Factory, Wipperfurth; C. A. Schaeffer K. G. (Hellux), Hannover.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

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FIAT REPORT NO. 288

UNCLASSIFIED

RURAL TELEPHONE SERVICE, DIAL SWITCHING FOR TELETYPEWRITER SYSTEMS, AND MISCELLANEOUS ITEMS. Reported by: J. A. Parrott. 11p.

A brief report of various communication applications in Germany. Rural telephone service is estimated at from 3 to 10 percent of the rural population. Extensive use of dialling system is used in railroad communication facilities. There is some use of toll line dialling and signalling but it is expensive and trouble is experienced due to frequency shifts. Dial switching for teletypewriter stations consists of six main switching centers able to handle up to 10,000 stations.

Item No. 33

FIAT REPORT NO. 526

UNCLASSIFIED

INDUSTRIAL SURVEY OF PLANTS, METHODS AND PRODUCTS IN GERMAN TELEPHONE INDUSTRY. Refer to Item No. 28 for a complete listing of this report.

Item No. 33

FIAT REPORT NO. 778

UNCLASSIFIED

CONDUCTION OF HIGH TENSION ELECTRICAL CURRENT IN CABLES EMBEDDED IN HIGH PRESSURE ATMOSPHERE. Refer to Item No. 9 for a complete listing of this report.

Item No. 33

FIAT REPORT NO. 920

UNCLASSIFIED

THE CONTACT CONVERTER AS DEVELOPED IN GERMANY. Reported by: O. Jensen and E. Goessel. 5 volumes. These reports, in 5 volumes, contain information for the manufacture of 50-200 Amp 300 V swash plate type (A.E.G.) and 200-10,000 Amp 400-800 V reciprocating contact type (Siemens-Schuckert) contact converters or mechanical rectifiers. The contact converter is a new conception in converting alternating current to direct current. It has not been developed or manufactured in the U. S. Vol. 1 contains the basic report and Appendices 1-6. It presents a description of the different types, their construction, and operation, and includes drawings for a Siemens 200 Amp 300 V converter and for 200 Amp choke coils. Vol. 2 consists of Appendix 7, detail and assembly drawings for 10,000 Amp 400 V and 5000 Amp 800 V contact converters. Vol. 3 (Appendices 8-12) consists of short circuiter drawings. Vol. 4 (Appendices 13-14) contains in Appendix 13 the original and translation of papers entitled "Electrotechnical principles of the mechanical rectifier" by Dr. Floris Koppelman who is the inventor of the contact converter manufactured by Siemens. These papers are in three parts as follows: Part 1 discusses the relation between short circuit voltage, size of choke coils, overload capacity, and backfire safety; Part 2 discusses the voltage drop of the rectifier, and its characteristic load and power factor; Part 3 deals with the question of the necessary duration of closing time of the contacts, followed by an examination of the limitation of overload capacity in the discussed "three choke coil circuit." The German version of these papers is reprinted from "Elektrotechnik und Maschinenbau," Nos. 17, 18, 35, and 36, 1942. Appendix 14 describes a method of accurately measuring the magnetization of loops, even when such loops come very close to being rectangular in shape and are passed through at a high rate of remagnetization speed. The arrangement also permits the measurement of the periodical course of magnetization and of magnetization current. The method employs motor-driven oscillating rectifiers having adjustable, contact time. The German is a reprint from "Archiv für Elektrotechnik," Vol. 38, No. 4, 1944. Vol. 5 (Appendix 15) consists of additional detail drawings received too late to be included in Vols. 1-3. See also PB L 70511 (FIAT Microfilm Reel AA 120) abstracted in v. 6, p. 103, this Bibliography.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 1005

UNCLASSIFIED

THE NIERS SEWAGE DISPOSAL PROCESS. Reported by: G. M. Ornsen. 35p.

The Niers Sewage Disposal Process as practised in its present stage of evolution at the sewage disposal plant of the Niersverband at Neersen, near Viersen, Rhineland, is described in this report, which is based on a study of war-time literature, a thorough field investigation, and exhaustive discussions with authorities on the subject. The conditions to be met were to purify city sewage and industrial effluents to the extent that they could be discharged without detriment into a receiving stream. This stream had an average rate of flow just about equalling the rate of flow of sewage on a per capita equivalent basis. This would correspond to a dilution of only 1:1. A bibliography, plant layout, flow sheet, drawings, and photographs are included.

Item No. 33

FIAT REPORT NO. 1010

UNCLASSIFIED

REVIEW OF THE DESIGN OF SUBMERGED HYDRO-ELECTRIC POWER PLANTS (SYSTEM ARNO FISCHER). Refer to Item No. 9 for a complete listing of this report.

Item No. 33

FIAT REPORT NO. 1034

UNCLASSIFIED

ENGLISH TRANSLATION OF THE FUTURE OF GAS TURBINE INSTALLATIONS. Refer to Item No. 26 for a complete listing of this report.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 1060

UNCLASSIFIED

PUMPED STORAGE POWER PLANTS IN EUROPE. Reported by: H. W. Hamm. 64p.

The report reviews the field of German, Swiss and French practices in the design of pumped storage plant units. These consist of one or two water turbines, one centrifugal pump and one or two electrical units serving as motor and generator. A considerable number of pumped storage units have been installed which use cheap night current, available in surplus quantity, from steam or hydro-electric plants, to pump water into storage reservoirs. This stored hydro-energy is used at times of peak load to furnish current that cannot be produced economically by other plants. In this manner cheap night current is converted into high priced peak load current, which frequently has resulted in lowering the production cost of electric energy. Pumped storage practice, the design of pumped storage units and the main distinctive features of seven plants are described in this report. Thirty-four illustrations and three tables complete the report.

Item No. 33

FIAT REPORT NO. 1111

UNCLASSIFIED

GERMAN WIND TURBINE PROJECTS PLANNED DURING THE HITLER ERA.
Refer to Item No. 9 for a complete listing of this report.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 1119

UNCLASSIFIED

METHODS OF TRANSMITTING 2,000,000 KILOWATTS OF ELECTRIC POWER 600 KILOMETERS. Reported by E. Krohne and H. Calliess. 24p. .

The report summarizes the results of an investigation made in 1941 at the direction of the German Office for Economic Development to determine the economic limits of a-c and d-c transmission by cable and overhead lines over long distances. Voltages of 220 kv, a-c; 400 kv, a-c; 650 kv, d-c; and 800 kv, d-c were considered. Tables are included covering (1) voltages, power factors, power losses, and overall efficiency; (2) limits of power and capacity utilized with uniform division of total load among transmitting systems; (3) estimated total and unit installation costs; (4) transmission costs for three annual times of utilization; (5) relative material requirements; and (6) specific material requirements.

Item No. 33

FIAT REPORT NO. 1124

UNCLASSIFIED

CIRCULAR GRIT CHAMBERS. Refer to Item No. 31 for a complete listing of this report.

FIAT ITEM NO. 33

UTILITIES, BRIDGES

Item No. 33

FIAT REPORT NO. 1158

UNCLASSIFIED

SOME WARTIME EXPERIENCES OF BERLIN POWER AND LIGHT CO.
(BEWAG). Reported by: R. I. Stockland. 28p.

This paper records some experiences of BEWAG during World War II, and is based on reports to the Board of Directors by Dr. Erich Krohne, its Technical Director. Information on air raid damage, maintenance of service, purchasing difficulties, and technical developments are included. A bibliography is given in Appendix I and two illustrations in Appendix II.

Item No. 33

FIAT REPORT NO. 1183

UNCLASSIFIED

COMPENSATION OF GROUND CURRENT THROUGH PETERSEN REACTORS
AND THEIR APPLICATION IN THE BEWAG 30 KV NETWORK. Refer to
Item No. 31 for a complete listing of this report.

UNCLASSIFIED

Item No. 32

REPORT NO. 1119

UNCLASSIFIED

STUDY OF TRANSMITTING 1,000,000 KILOWATTS OF ELECTRIC POWER 200 KILOMETERS. Reported by E. Frohne and H. Callaway.

This report summarizes the results of an investigation made in 1941 at the direction of the German Office for Economic Development for studying the economic limits of a-c and d-c transmission by cable and overhead lines over long distances. Voltages of 200 kv, a-c; 400 kv, a-c; 550 kv, d-c; and 600 kv, d-c were considered. Tables are included covering (1) voltage, power factor, power losses, and overall efficiency; (2) limits of power and capacity utilized with uniform division of total load among transmitting systems; (3) estimated total and unit installation costs; (4) transmission costs for three annual rates of utilization; (5) relative material requirements; and (6) specific material requirements.

Item No. 33

PLAT REPORT NO. 1304

UNCLASSIFIED

STUDY OF CABLE POWERING. Refer to Item No. 31 for a complete listing of this report.

